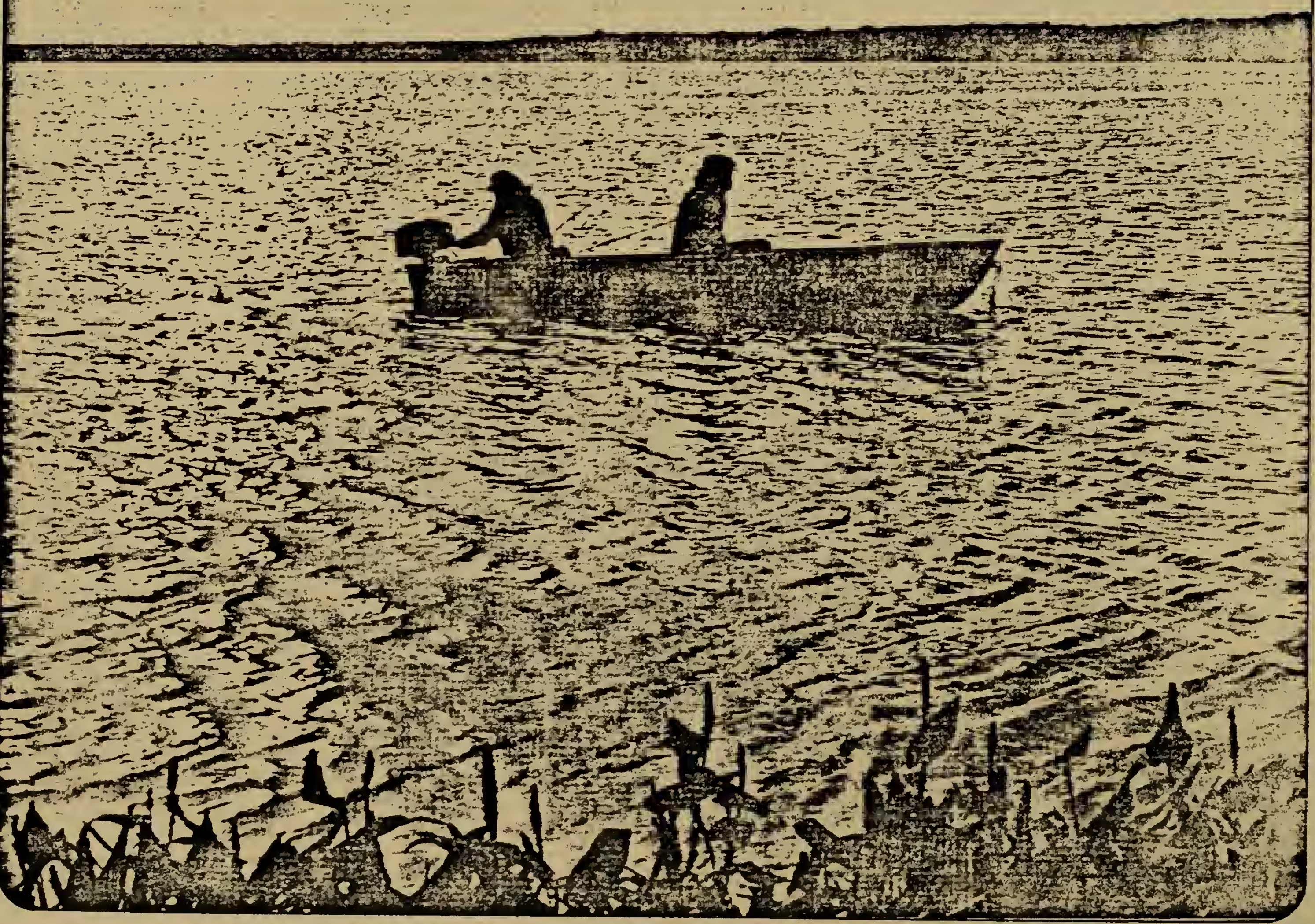
final lake phelps lake management study

book one

book one
- management plan
- environmental impact statement



STATE OF NORTH CAROLINA
OFFICE OF THE GOVERNOR
RALEIGH 27611

JAMES B. HUNT, JR
GOVERNOR

Dear Concerned Citizens:

The State of North Carolina, through the auspices of the Department of Natural Resources and Community Development is committed to managing Lake Phelps State Lake in a manner that is environmentally and socially responsible. We need the thoughts and commitment of citizens like you to do it.

In October, 1978, I directed Secretary Howard N. Lee to develop a management plan of action to deal with the myriad water problems associated with the lake, and to assure that this plan is in full compliance with the N. C. Environmental Policy Act. The Management Plan and Environmental Impact Statement describes the steps that North Carolina must take in reducing flooding frequencies and durations while maintaining and enhancing the superb natural and recreational environments of the lake.

Of course no plan could completely solve all of the concerns at the lake to everyone's satisfaction. This plan is deliberately flexible and meant to mature as our knowledge of the lake grows.

Please read the Management Plan and share with us your constructive thoughts on the management practices we will employ. I hope very much that you will support this project.

Sincerely,

Jas B Hunt, Jr

James B. Hunt, Jr.

North Carolina Department of Natural Resources & Community Development
James B. Hunt, Jr., Governor
Howard N. Lee, Secretary

March 10, 1980

The Honorable James B. Hunt, Jr.
Governor
State of North Carolina
Raleigh, North Carolina 27611

Dear Governor Hunt:

The Department of Natural Resources and Community Development is pleased to transmit to you our Final Lake Phelps Lake Management Study. We have gone to great lengths to utilize all existing data sources and to involve the local citizens concerned about the lake.

We will continue to be responsive to local comments and concerns as we begin to actively manage the lake level in the manner predicated by the Final Lake Phelps Lake Level Management Plan and Environmental Impact Statement.

With kindest regards and best wishes, I am

Respectfully yours,

Howard N. Lee

P. O. Box 27687 Raleigh, North Carolina 27611

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FINAL

LAKE PHELPS LAKE MANAGEMENT STUDY

BOOK ONE

THE MANAGEMENT PLAN AND FINAL ENVIRONMENTAL IMPACT STATEMENT

State of North Carolina
Department of Natural Resources and Community Development
Division of Parks and Recreation

March 17, 1980

SUMMARY

Final
LAKE PHELPS LAKE LEVEL MANAGEMENT
WASHINGTON, TYRRELL COUNTIES,
NORTH CAROLINA

[ ] Draft Task Force Report/Management Plan / Environmental Impact Statement

[x] Final Task Force Report Management Plan / Environmental Impact Statement

RESPONSIBLE OFFICE: N. C. Department of Natural Resources and Community
Development, Division of Parks and Recreation
P. O. Box 27687
Raleigh, North Carolina 27611

1. NAME OF ACTION: [x] Administrative [ ] Legislative

2. DESCRIPTION OF ACTION: Lake Phelps is classified as a North Carolina State Lake, and as such, is the property of the State of North Carolina, and is administered by the N. C. Department of Natural Resources and Community Development, Division of Parks and Recreation. Therefore, the obligation and mandate for regulation and control of the Lake Phelps water level falls upon this Division. The proposed action is based upon the premise that before any management can occur, the current disrepair of the lake drainage canals and gates be rectified. An optimum water level range has been established which will ensure the ecological integrity of the lake and maximize outdoor recreation benefits to be derived from the lake, while preventing (when possible) any deterioration of the land neighboring the lake (caused by lake flooding). The State will strive to maintain the lake level within a fluctuation range of 10.73' above msl to 11.67' msl. The resultant optative (average) lake level will approach 11.26' msl and the managed mean high water level will be at 11.5' msl. Furthermore the total average possible fluctuation range will be 10.41' msl to 12.10' msl. The lake fluctuation year has been divided into four hydro period management phases, each with its own optative focal level, optimum fluctuation range, and total possible (uncontrollable) fluctuation range. Implementation of the management plan will result in the lake exceeding the optimum fluctuation range and entering the total possible fluctuation range for widely spaced occurrences of short duration. Insofar as any given lake level is largely governed by precipitation amounts and durations, and wind velocities and directions, there will be times when man cannot control the lake level.

3.a. ENVIRONMENTAL IMPACTS: Provides direct benefits to recreation, wildlife, vegetation, and flood protection resource components by allowing a high lake level in the summer, flood storage in the fall, and a release of water in the spring and fall.

3b. ADVERSE ENVIRONMENTAL IMPACTS: The project will require additional dredging expenditures for Pettigrew State Park Master Plan implementation and facility maintenance; will periodically decrease fishery spawning and feeding areas (possibly resulting in a slight decrease in population size), and will present the slight probability of short-term lake rim flooding from high lake water levels and adjacent farmland property flooding from high water levels in the canals.

4. ALTERNATIVES: Six lake level management alternatives were studied:

a. No Action - no attempt to control lake level fluctuation.
b. Recreation - lake levels established to maximize recreation benefits.
c. Wildlife - lake levels established to maximize wildlife benefits.
d. Vegetation - lake levels established to maximize vegetation benefits.
e. Flood Protection - lake levels established to maximize flood protection benefits.
f. Composite - compromise lake levels established to maximize benefits for all components.

The alternative (composite) of setting the lake fluctuation range at 10.73 - 11.67' msl (as described previously under Description of Action, is the recommended alternative. This alternative will provide equal benefits and equal environmental costs per each resource component studied. The quality and quantity of benefits clearly outweigh the environmental costs.

PREFACE

Situations influencing and impacting Lake Phelps have been studied sporadically for the past twenty-seven years. During the period from 1974 to the present an intense effort has been made to assimilate data from previous studies and to generate new and pertinent data regarding the lake and the factors which affect the management of the lake's water level. This Management Study is based on that data as well as input provided by private citizens, neighboring landowners, and other interested parties. Additionally, policies written and unwritten which have evolved through the years have been considered in this project.

The tenent of this Management Study is that the lake level must be so managed to reduce flood frequencies and durations, enhance wildlife habitat, maintain and support outdoor recreation opportunities, and preserve the lake's natural integrity for the combined best interest of the citizens of North Carolina, their visitors, the lake's neighbors, and the landowners along the canals which drain the lake water.

The Final Lake Phelps Lake Management Study consists of two primary parts that were combined into one document during the circulation of the draft study: Book One contains the Lake Phelps Lake Level Management Plan and Final Environmental Impact Statement, and Book Two contains the Task Force Report, other technical reports, and the appendices. The Task Force Report, which was begun in June 1975, and completed in June 1977, was the culmination of a multi-disciplinary inter-agency study requested by the Director of Division of Parks and Recreation (N.C. Department of Natural Resources and Community Development). The primary purpose of the Task Force was to develop a water management policy for Lake Phelps that would reflect as objectively as possible, the management goals of the area and the environmental, social, and economic considerations relevant to the lake's management. However, the final document content focused on resource inventory data, land use inventory data, and identification of site problems and alternative courses of action to deal with them. In order to update and reduce the circumlocative nature of the Task Force Report, it has been rewritten and edited (for inclusion in Book Two) with most of the irrelevant data eliminated.

Management planning activities since the 1977 submittal of the Task Force Report have involved many private individuals, groups, and government agencies. During the initial planning stages, the Division of Parks and Recreation conducted two public meetings in Creswell, N.C. (August 24, 1978 and September 14, 1978) from which the public provided valuable information concerning lake level management. Active preparation of the written management plan was initiated on February 7, 1979, for which this information, along with other prevous studies such as the Task Force Report provided a solid foundation.

Due to extremely restrictive time and personnel allocations during this period, and the desire to prevent large scale data duplications, the prescribed formats for the content of environmental impact statements and management plans were combined. The result is a short, concise document that can be understood by the layman which meets all the requirements of the North Carolina Environmental Policy Act and the majority of those of the National Environmental Policy Act. Whereas, the data contained in Book Two of this study presents an overall picture of the ecological, recreational and social environs of the Lake Phelps region, the data in Book One concentrates solely on the factors dealing directly with, and which could be impacted by lake level management. By utilizing this combination format, the content of the document evolved from a planning/environmental assessment procedure which analyzed various alternatives, to the scientific and administrative acceptance of the subsequent most advantageous and least damaging alternative. From this point, this best alternative became the proposed action/management plan, which was then subjected to more intensive analysis.

The draft management plan/environmental impact statement was predicated on the assumption that the State of North Carolina would have the ability to manage the level of the lake, and reported (at the time of the initial document preparation) this ability was hampered by the severe disrepair of the water level control gates and canals. However, since that time, personnel of Pettigrew State Park have completed maintenance on the gates so that the gates are currently fully operable. Nonetheless, several of the associated canals are still choked with sediment. On June 8, 1979, the Division filed a Final Negative Declaration with the State Clearinghouse (SCH File #128-79) for additional gate repair work and for lake-to-gate canal dredging. In September 1979, Pridgen Consultants, Inc. delivered their contracted canal and gate engineering study to the Division.

On August 10, 1979, the Division forwarded the Draft Lake Phelps Lake Management Study to the State Clearinghouse for statewide public review as mandated by the North Carolina Environmental Policy Act. Throughout, and after the review period (which ended on September 17, 1979), the Division received numerous comments on the draft, which are included at the end of Book One, and from which several important changes were made in the text. The plan modification continued during numerous Department and Division meetings, contact with private individuals and groups, and additional lake study. On October 11, 1979, the plan was presented to the Planning and Special Issues Committee of the Coastal Resources Commission. On October 19, 1979, the first draft of the Final Lake Phelps Lake Management Study was presented to the Secretary, Deputy Secretary and Assistant Secretary of the N.C. Department of Natural Resources and Community Development for their consideration. After additional refinement, on December 13, 1979 the plan was presented to the Washington and Tyrrell County Boards of Commissioners and other interested citizens at a public meeting in Raleigh. On January 17, 1980, the final plan was presented at a public meeting in Creswell, North Carolina.

On January 21, 1980, Solmon Matthis and Associates began surveying the N.C. State Lakes regulatory limit line around Lake Phelps at an elevation of 11.5 feet mean sea level.

This management study has been prepared based on the assumption that the State will have the ability to control water releases from the Lake. In order to fully possess this control ability, gates must receive final repair and/or replacement as recommended in the engineering study and the canals cleared of the sediment accumulations (or other possible practices implemented to deliver the lake water to the control gates). Upon completion of this work, and the ultimate State Clearinghouse approval of this final document, the Final Lake Phelps Lake Level Management Plan contained in Book One will be implemented.

As we mentioned earlier, not only was this document based on existing data, but that data is based on short-term records. In order to maximize the success of the management plan, it is imperative that various scientific research continue. This would include continued lake level monitoring, rainfall and wind measuring, and many other components (discussed in this document).

During the course of the many meetings conducted during the preparation of this management study, the Department of Natural Resources and Community Development has attempted to be responsive to the needs and desires of the Lake Phelps riparian owners and other surrounding landowners. The Department is currently studying several means for recognizing these needs and desires as they relate to the permit process required by the N.C. State Lakes Regulations, the Coastal Area Management Act, and the U.S. Army Corps of Engineers. Whereas the management plan fully addresses the rights of the riparian owner, and the protection of the lake's natural resources base, the Department also desires to be responsive to the rights of the riparian owner as they relate to adverse impacts that may result from lake management and doing so in the best interest of all of the citizens of the State of North Carolina.

In order for the reviewer to place the mathematical terms contained in this document into proper perspective, the following table should prove beneficial:

1 cubic foot per second (cfs) = 650,000 gallons per day
= 448.8 gallons per minute

1 cubic foot per second = 86,400 cubic feet per day
= 2 acre feet per day

1 acre foot = 325,851 gallons
= 0.5 cubic feet per second per day

1 inch of rain = 27,154 gallons per acre

1 cubic foot = 7.48 gallons

At a lake elevation of 11.00' above mean sea level, Lake Phelps has a volume of 26,066 million gallons. A release rate of 350 cubic feet per second per day would drop the lake level one-half inch a day (not counting precipitation additions or evaporation and leakage losses).

All lake elevations described in the Final Lake Phelps Lake Management Study are based on the 1976 second order traverse of Lake Phelps performed by the N.C. Geodetic Survey. Specifically, lake elevations are referenced to Benchmark WAS-12, located in the concrete base of the boat supply house at Pettigrew State Park established by the above noted survey at an elevation of 12.267 feet mean sea level, and TBM X, established by the Division of Parks and Recreation at an elevation of 12.14 feet mean sea level. This benchmark was used to correctly set the lake level monitoring staff gauge. This 1976 N.C. Geodetic Survey supersedes the data from all previous Lake Phelps elevation surveys. The current State Lakes regulatory limit line survey being performed at Lake Phelps is tying into the 1976 survey.

This Management Study is the first guideline for the orderly management of the Lake. As such, it is flexible as new data which evolves from it's implementation must be considered and incorporated in future management decisions and practices. The Division of Parks and Recreation will, with the assistance and cooperation of State and Federal agencies as well as private citizens, monitor the success of the Management Plan and be receptive to change where necessary.

Comments regarding this management plan should be addressed to the principal authors of the Lake Phelps Lake Management Study:

Richard B. Hazard
Thomas R. Wells
North Carolina Department of
Natural Resources and Community Development
Division of Parks and Recreation
P. O. Box 27687
Raleigh, NC 27611

FINAL
LAKE PHELPS LAKE MANAGEMENT STUDY
WASHINGTON AND TYRRELL COUNTIES, NORTH CAROLINA

* BOOK ONE *

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INTRODUCTION

Through the years of concentrated study and public input concerning lake level management at Lake Phelps, the Division of Parks and Recreation has become aware of the extent of the myriad intricate concerns and problems at the lake. However, as defined by the North Carolina State Lakes Regulatons: "...Lake Phelps is the property of the State of North Carolina and administered by the N.C. Department of Natural Resources and Community Development, Division of Parks and Recreation. The term State Lake unless specifically limited, shall be deemed to include all property up to the mean high water mark, whether covered by water or not..." therefore, several concerns, such as the potential Lake Phelps Area of Environmental Concern designation, rim septic tank regulations etc., fall outside the Division's jurisdiction and thus are not addressed per se in this management study.

In order for the management study to be successful in addressing the Division's direct jurisdictional concerns at Lake Phelps, the following items must be considered now and in the future:

1) Water quality should be maintained at a minimum "B" classification and necessary steps to retain this rating should be the responsibility of the Water Quality Section and the Division of Parks and Recreation.

2) Sufficient vegetative buffer must be maintained for the protection and preservation of the fishery and wildlife habitat. Responsibility should be with the Wildlife Resources Commission and the Coastal Resources Commission as well as with the Division.

3) The situations surrounding the potential algae bloom should be constantly monitored and corrective steps taken as necessary. The Division of Parks and Recreation, in conjunction with scientists from North Carolina State University, will work toward solving this problem. Note: In no case should existing silt and sediment be disturbed when the water temperature is above 12°C.

4) The Master Acquisition, Development and Operation Plan (Master Plan) for Pettigrew State Park should be carried out in an orderly and timely fashion so that the full recreational benefits of the lake are available to potential users of the park and the lake. The Design and Development Section of the Division bears responsibility for this item.

5) A management plan should be developed for Pettigrew State Park so that the Lake Phelps Management Plan and Pettigrew State Park Master Plan may be incorporated into one set of guidelines for the orderly development and management of this complex natural and recreational area. The Management Planning Unit of the Planning and Special Studies Section of the Division should begin their activity during 1980.

6) The revision of *The North Carolina State Lakes Rules and Regulations* should be undertaken by the Division and the N.C. Attorney General's office to address the unique situations which occur at Lake Phelps.

Furthermore, it is of the utmost importance for the reviewer to understand the numerical terminology presented in this document (specifically with regard to the verbiage - target elevation 11.50' msl and lake level fluctuation range of 10.40' msl - 12.00' msl).

This terminology is defined as:

The yearly lake fluctuation management time frame has been divided into the four hydro-management periods of: 1) November to early February - a period of lake recharge where the lake's top level is of prime concern, 2) early February to mid-March - a period of flow release for the anadromous fishery, where the lake's bottom level is of prime concern, 3) mid-March to mid-July, a period of lake recharge, where the lake's top and bottom levels are of prime concern, and 4) mid-July to late October, a period of flow release in preparation of the tropical storm season and for the anadromous fishery, where the lake's top and bottom levels are of prime concern.

The State of North Carolina will attempt to manage the lake level fluctuation so that is remains in the following ranges:

Period 1	10.63' - 11.52' msl
2	11.08' - 11.76' msl
3	10.73' - 11.67' msl
4	10.47' - 11.71' msl

As a result, the optative lake level for each period will be: 1) 11.13' msl, 2) 11.47' msl, 3) 11.27' msl, and 4) 11.18' msl. The resultant yearly average optative lake level will be 11.26' msl. The managed mean high water level will be at 11.50' msl. However, as is described in greater detail later in this document, within these management fluctuation ranges, there is a slight chance the lake will exceed these average ranges. Based on computer modeling, the actual possible extreme fluctuation range per each hydro-period will be:

Period 1	10.51' - 11.87' msl
2	10.96' - 12.07' msl
3	10.56' - 12.09' msl
4	10.41' - 12.10' msl

The reviewer is urged to refer to this terminology as necessary when confronted with the terms - target elevation of 11.50' msl and fluctuation range of 10.40' - 12.00' msl.

In order to clarify the intended Lake Phelps Lake Level Management documentation and implementation chronology, the following flow chart is presented:

*Task Force Report preparation

*Pettigrew State Park Master Plan preparation

*Pettigrew State Park Environmental Impact Statement preparation

*Canal gate test openings and research project

*Various departmental meetings

*Management Plan/Environmental Impact Statement preparation

*Engineering Study for canal gates and sediment removal

*Management Plan/Environmental Impact Statement finalization

*Negative Declaration preparation for canal gate and canal maintenance

State lakes regulatory limit line survey (in progress)

Preparation of Standard Operating Procedures for Management Plan implementation

Final maintenance of canal gates and canals

Implementation of Management Plan

Continued lake level research programs

Continued management plan success evaluation

Periodic structured departmental analysis of management plan success.

As of February 29, 1980, the steps indicated by an '*' have been completed.

1. THE PROPOSED ACTION - LAKE PHELPS LAKE LEVEL MANAGEMENT PLAN

This management plan is based on the assumption that the State will have the ability to perform its designated responsibilities regarding the equitable stewardship of Lake Phelps and its environs. As described in the preface, this assumption involves the performance of final water control gate repair and/or replacement, and the deliverance of the lake water to the control gate. Once these items are completed, the Division of Parks and Recreation will undertake lake level management as prescribed in this document.

Among the concerns regarding lake level control is the safety and well being of life and property along the drainage canals. The State has thoroughly analyzed these concerns in its deliberations regarding lake levels. Other concerns involving water levels which the State has addressed are outdoor recreation demand and use of the lake in its present and future condition. Sufficient water levels must be maintained to ensure visitor safety and satisfaction.

Certainly, additional factors have been taken into account, and all have had an affect on both the establishment of the recommended water levels and the selected methods by which those levels might be obtained.

It must be recognized that the State cannot control all of the conditions which might influence the level of the lake at any given time; nor can they satisfy the needs and desires of the myriad interests which gave rise to this study.

The following is a plan of action for water level control at Lake Phelps. While representative of sound environmental protection, and managerial practices and procedures, this plan of action and its subsequent benefits and costs must be periodically reviewed to accommodate changing needs, situations, and circumstances.

Briefly described in Section 3.7, upon analysis of various water level management alternatives, the composite alternative that attempts to balance the benefits with the adverse environmental costs was selected as the most feasible and viable alternative. Upon such analysis procedures, this desirable alternative has become the proposed management plan. The Lake Phelps water level program will be targeted at a lake level of 11.50' (note introduction) above mean sea level. At such a target elevation, the State should have the ability to maintain the water fluctuation between the limits of 10.4' msl to 12.00' msl most of the time. A target elevation of 11.50' does not necessarily imply that the lake will be maintained at that constant level throughout the year, but it does describe an optimum (maximum desirable) level from hereon described as the managed mean high water level. Whereas, it is possible that environmental costs will proportionately increase faster with every water level increase above 11.50' versus every decrease below 11.50', the major management emphasis will be placed on the prevention of water levels exceeding 11.50' msl.

In order to accomplish this, and based on many data inputs (historical precipitation amounts, durations, timing, evaporation, seepage, wind patterns, farmland draining needs) a maximum release flow of 350 cfs (one-half inch of lake drawdown per day) will be attempted. This flow release will be altered accordingly per farmland drainage needs, periods of drought, etc. Extreme conditions would cause the lake level to fall below 10.5' msl two times in 22 years for an average duration of six days per time (in the computer modeling, this occurred in August, September, and January); and the lake would exceed 12.0' msl five times in 22 years for an average duration of nine days per time (once in February, twice in September, once in July, three times in October).

Other water level fluctuation considerations have been incorporated in this plan. The State should be able to (in average cases) release water from the lake from early February to mid-March in order for the proposed Bee Tree Canal fish ladder to operate, and to provide an attractant flow of water in the canals (to induce the blueback herring and alewife to extend their spawning runs into Lake Phelps. NOTE: Farmland drainage needs will allow the release of the minimal attractant flow until approximately mid-May). From mid-March until mid-April, the gates would be closed in order to allow for the farmland drainage canals to operate at maximum efficiency (and thus provide the farmers a fairly dry land base in which to get their crops in.) From mid-April to mid-July, the lake water levels will be managed so as to obtain a level as close to (but under) 11.5' msl as possible in order to maximize recreation, vegetation, and wildlife benefits. Depending on the precipitation quantities for any given year, and the level of the lake in July, around the middle of July (plus or minus one month depending on the above parameters) water will be released from the lake in order to provide adequate hurricane - storm flood storage capacity in the lake. During this season, (mid-July to the end of October) the State will attempt to maintain the lake level between 10.4' msl and 11.0' msl. Furthermore, with the release of water at this time, the herring and alewife will have the opportunity to leave the lake and return to the Scuppernong River. Finally, from early November to early February, the lake will be allowed to fill to prepare for the early spring flow release.

During these management periods, gate opening and closing recommendations are not absolute. Periodic monitoring of the hydrologic conditions will provide an additional data input (while considering the management) goals so as to prevent extreme lake fluctuation.

In order to approach these target levels, the following steps should be taken by the Superintendent and staff at Pettigrew State Park:

1. INSPECTION: A visual inspection of the water control gates and canals shall be made to ascertain the adequacy of the structures to accomodate the flow in a safe and efficient manner. The inspection must take place early enough so that any problems discovered can be noted and corrected prior to further water release activities. (See Section 4.4, Water Control Gates and Canals Management of the Task Force Report.

2. NOTIFICATION: Following the guidelines presented in this report, the Superintendent should notify his supervisor

(Raleigh office) and the Lake Phelps Advisory Committee of the intent to release water into the canals at a minimum of three days prior to planned gate opening. He should specify in that notification which canals are to be opened, an approximation of the amount and duration of water flow, and an indication of the approximate resultant water depth in the canals to be expected. It must be noted that in certain circumstances (ie: imminent hurricanes, heavy rain storms, high lake levels, or other possible urgent situations) the Superintendent must have the authority and support to make judgements in an emergency basis. In such a case, he would notify the Committee and the administrative offices in Raleigh after-the-fact of gate openings. The Superintendent is also responsible to keep the gates closed in time of drought unless a crisis situation arises as a result. Water released under drought conditions must be authorized in writing by the Department Secretary.

3. ACTION: After completion of steps 1 and 2, the gates should be gradually opened to the desired position to avoid a sudden unnecessary increase in the canal(s) water level.

4. MONITORING: Every canal which is actively flowing should be inspected daily from the lake to a point no less than 2 miles downcanal from the gates (and further where necessary). Those canals having bridges and/or culverts should be reviewed for debris blockages which could cause overwash or unnecessary inundation of roads or farmland. Removal of debris accumulations around culverts prior to water release will assist in the prevention of overwash. Water - course bank erosion will occur in some instances and must be dealt with on a routine basis.

5. GATE CLOSINGS: Notification procedures should be followed per item #2 of this section. The Lake Phelps Advisory Committee and the Raleigh Office of the Division of Parks and Recreation should be notified at least three days in advance of the closing of the canal gates.

The responsibility for the management and administration of water level control activities will fall on four groups. The N. C.Department of Natural Resources and Community Development, Division of Parks and Recreation has the legal responsibility to manage Lake Phelps. The Superintendent in charge at Pettigrew Sate Park will administer and carry out the water level management plan on the site. The Lake Phelps Advisory Committee is a group established to notify the Superintendent of any potential situation (of which it is aware) that might arise prior to a water release into the canals. Additionally, the committee serves as a body to represent the interests of neighboring landowners with regard to the opening and closing of the control gates. The Pettigrew State Park Superintendent will serve as the liaison person for the Committee.

Members of the committee will be appointed for a period of two years (with the provision that members may be re-appointed at the end of the term) by the Secrtary of the Department of Natural Resources and Community Development. The five member committee with the Superintendent of Pettigrew State Park as an ex officio member shall elect the chairperson annually, and will meet at least every six months and as necessary. Members of the Advisory Committee shall be represented by a County Commissioner from Washington and Tyrrell Counties, a representative from the Town of Creswell, a non-farmer, and a member of the Washington County Soil Conservation District Board. This appointed Lake Phelps Advisory Committee will supersede any previous Lake Phelps Water Level Control Committee which existed prior to February 1, 1980.

The neighboring landowners who own land and/or practice farming operations along the affected canals bear certain responsibilities. These responsibilities, which are less structured than those listed above are no less important to the success of the management program. Interceptor ditches draining into the canals should be kept clear of debris in order to help prevent water backup onto their land or neighboring lands. Possible water backup into fields from interceptor ditches along the canals might be reduced by the installation of simple ditch blocking devices by landowners at the interceptor ditch outfalls at times when the canals may be flowing full. Finally, the USDA Soil Conservation Service, Washington and Tyrrell County Commissioners and the State of North Carolina have joined forces in the past to plan, design, fund, and implement major canal maintenance. This should be considered as a long-term solution to periodic sediment accumulations in the canals(regardless of whether the source of the sediment is from the lake or from field runoff into the interceptor ditches.)

The preceding management practices and policies are to be adhered to in all but emergency or highly unusual circumstances. Below are some guidelines, which if followed will assist in creating a more stable and efficient water level control process.

1. EQUITABLE WATER FLOW: It is recommended that when feasible, at least four gates be opened at the same time. This is to reduce accelerated bank erosion on any given canal. If it is necessary to open only one gate, care should be taken to open another gate if circumstances dictate a repetition of singular gate use.

2. RECORD KEEPING: A complete set of records indicating dates of gate opening and closing, lake levels at the time, conditions which precipitated the action, notation of salient features regarding the procedural steps followed, climatic conditions, etc. should be maintained for future reference. These records will also provide NRCD administrators with future decision making tools, and will, over the long-term, indicate the success or failure of water level control structures and practices.

In addition to this record keeping, other current data gathering processes and additional scientific investigations must be carried out on a continual basis. Such studies as: precipitation measuring at the lake; wind direction, velocity, and affect on the water level of the lake and canal measurements; correlation analysis between rainfall, wind evaporation, and flow releases with lake levels; amount and duration of farmland flooding and the causes; and study of the effectiveness of the fish ladder and attractant flows in inducing herring and alewife into the lake are but a few of these studies. With a more comprehensive data base in the future, administrators can refine (if necessary) this management plan so as to maximize management plan objective satisfaction.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.1 LOCATION. Lake Phelps, the second largest natural fresh water lake in North Carolina is located in the eastern part of the state and straddles the dividing line between Washington and Tyrrell Counties. The 16,600 acre lake formed on a vast peninsula lying between Albemarle Sound on the north and the Pamlico River on the south. This peninsula contains numerous low-lying swampy areas underlain by thick organic muck as well as relatively well drained areas with fertile mineral and organic soils. In the past ten years, much of the region has been cleared of vegetation, drained, and put into large scale agricultural use. Major access to the lake is gained via U.S. 64 (a major east-west route) and numerous secondary roads. Please note the regional location map and the primary and secondary access map in the Appendix, pages A.1, A.2 of Book Two.

2.2 TOPOGRAPHY. Lake Phelps and its encircling rim represent the highest elevation in the immediate area. The crest of this rim has an elevation of 14-15 feet above sea level except for a gap in the north side, where the highest elevation is about 12 feet. The lake reaches a maximum depth of approximately 7 feet near the center, however, the average depth is approximately 5 feet. The highest elevations in the lake region approach 20 feet above mean sea level and occur primarily along the western boundary of the region. Eastward, there are no perceptible changes in slope except near streams and lakes and around the margins of the area. The general slope of the land surface toward the sounds and estuarines range from a maximum of five feet per mile to a minimum of less than one foot per mile. Nearly two-thirds of the area, including most of the eastern portion, is less than five feet above sea level. Please note the topography map on page A.3 in the Appendix in Book Two.

2.3 CLIMATE. Lake Phelps is the highest area in the region and thus receives virtually no overland run-off. Climate (and in particular, precipitation and wind) is one of the dominant factors determining the water level of the lake. Climatological data of three stations near Lake Phelps (Plymouth 5E, Belhaven, and Columbia 2) from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration - Environmental Data Service indicates that the Lake Phelps region receives on an average 53.14 inches of rain per year (based on records from 1964-1977).

The data in Table 1. indicates that August receives the most precipitation, April the least; July is the highest evaporation month and December the lowest; there is the greatest amount of excess water in January and the least in June; April is the windiest month and August is the calmest, and the prevailing wind direction is from the southwest from January to August, from the northeast from September to November, and from the west in December. Data from Wilmington, North Carolina indicates the average monthly temperatures are as follows:

January	47.9°F	July	80.0°F
February	48.7°F	August	79.4°F
March	54.2°F	September	75.2°F
April	62.5°F	October	65.4°F
May	70.5°F	November	55.4°F
June	77.7°F	December	48.2°F

Table 1. illustrates some other miscellaneous significant climate data.

TABLE 1. MISCELLANEOUS CLIMATE DATA - LAKE PHELPS REGION
1964-1977

Month	Precipitation[1] (Pg) inches	Evaporation[2] (E_w) inches	Excess Water $(Pg - E_w)$ inches	Wind[3] Velocity mph	Prevailing Wind Direction
January	4.05	1.41	2.64	9.7	SW
February	3.96	1.69	2.27	10.6	SW
March	3.93	2.60	1.33	11.2	SW
April	2.84	3.46	-0.62	11.4	SW
May	5.09	4.48	0.61	10.0	SW
June	3.93	4.72	-0.79	9.2	SW
July	6.79	5.28	1.51	9.1	SW
August	6.27	4.86	1.41	88.5	SW
September	4.91	3.89	1.02	8.7	NE
October	4.53	3.20	1.33	8.6	NE
November	3.00	1.98	1.02	8.9	NE
December	3.82	1.34	2.48	8.8	W

[1] - Data from U.S. Department of Commerce, NOAA, 1964 - 1977.

[2] - Data from Tang, H., 1978.

[3] - Data from Hardy et. al., 1955; for Wilmington, North Carolina.

During the record period of 1886-1970, and within a 12 month period, 4 hurricanes made landfall in North Carolina. On an average, hurricane winds occur within 50 miles on each side of the storm, and gale force winds (39-54 mph) occur up to 200 miles on each side. In any given tropical storm, the storm surge is responsible for the most damage, followed by flooding caused by torrential rains, and wind creates the least damage. Generally, in the Lake Phelps area, the greatest potential for tropical storm damage takes place in September and October, and resultant impacts could take the form of: 1) minor flooding from increased wave action, 2) major flooding from torrential rains, and 3) damage to agricultural lands from high wind velocities.

Table 2. presents some significant hurricane data:

TABLE 2. COASTAL NORTH CAROLINA TROPICAL STORM DATA
1886 - 1970

Storm Type	Wind Velocity MPH	Earliest/ Latest Date of Occurrence	Number of Storms	Storm Separation; Years	Probability For Any Given Year
Tropical Cyclone	40-73	July/ Sept. 16	8	10	9%
Hurricane	74-124		7	12	8%
Great Hurricane	125+		3	28	4%

More detailed climate data may be found in the Appendix on pages A.15, A.24 and A.27 of Book Two.

2.4 LAND USE. Active use of the land base in the Lake Phelps region has a long history dating back to the 1780's when Josiah Collins and the Lake Company begin construction of an elaborate canal system. Originally attempted as a device for draining the lake so that the land could be used for agricultural purposes, the canals were later used for water power and for draining the vast areas of low-lying swampland. Although the agricultural importance of the land base declined for a period after the Civil War, it is of now paramount importance to the region's current socio-economic condition. As of 1974, three large tracts totaling 414,500 acres were in the process of being drained and cleared for intensive farming and livestock operations. The canal system throughout the region has been thoroughly developed over the years and is a necessity for continuing the cultivation of the land. The intricate system of drainageways lowers the existing high water table, and thereby enables men and machinery to work the land.

Ownership of shoreline-rim property falls into three categories. The entire eastern half of the shoreline is platted in small lots with several houses and mobile homes with septic tank waste disposal systems already in place. This development is expected to continue at a slow pace. Secondly, First Colony Farms owns most of the western and southern portions of the lake border. Several houses and mobile homes have been developed on these lands. As of June, 1978, there were a total of 22 houses and 26 mobile homes located along the shoreline of Lake Phelps. The State of North Carolina, Division of Parks and Recreation is the third major landowner. Two tracts currently compose Pettigrew State Park: a 500 acre area of pocosin on the southern edge of the lake, and approximately 269 acres on the north shore (which contain the park facilities and the Somerset Place State Historic Site). Furthermore, under the North Carolina State Lakes Regulations, the Division of Parks and Recreation owns all property up to the mean high water mark, whether covered by water or not (at the time of this writing, the mean high water mark at Lake Phelps had not been established). Supplemental land use data that is contained in the Appendix Book Two on pages A.5 - A.10, A.12 consists of a Land Use Map, Land Owned by Corporate Farms Maps, three Cultivated Land Maps, and an Artificial Drainage System Illustration.

2.5 Soils. Although there are two major Pleistocene Age geological formations underlying Washington and Tyrrell Counties, the Pamlico Terrace is the one directly responsible for the composition of the region's soils. This terrace, which is representative of a period of marine inundation, contains a parent material of sand, silt and clay which formed under forest cover. Due to the swampy condition of the terrain, the resultant soils are highly acid and high in organic material content. Eight soils are found on the Lake Phelps shoreline. The Wysocking soils (fine textured mineral layers overlying highly decomposed organic layers) form the rim or berm of the lake on the entire perimeter, however, the major portion of this unit is north and northwest of the lake. Along the southeast, south, and western boundaries of the lake, the well decomposed organic Scuppernong, Mattamuskeet, Belhaven mucks and Pungo Woody soils are dominant. In addition to these perimeter soils, the entire south and east shoreline of the lake and a small section of the north shoreline contain large sand deposits. Finally, due to prevailing wind/wave directions, there are large sediment deposits along the northern shore of the lake. This large concentration of sediment in this region has resulted in several problems. First due to the absence of periodic canal gate openings in the last ten years (the periodic flushing of the accumulations in the canals in the past prevented large deposits from forming), high water levels and times of high wind, these sediment deposits have blocked all of the canals, thus decreasing their current efficiency (flow capacity) to varying degrees. Furthermore, the sediment buildups may eventually alter the trophic diversity of the northern bordering Cypress Natural Areas while creating additional facility and property maintenance problems at Pettigrew State Park and Somerset Place.

The source of this sediment is a combination of internal and external factors. Internal sources consist of buried veins, layers or lenses in the lake bottom exposed by wave and water erosion. The high phosphate content of the sediment indicates that the external source of the sediment consists of air dried and wind transported organic soils that border the lake. Please consult the Appendix (pages 42, A.17, A.19, A.29) for a lake perimeter soil map, and miscellaneous lake sediment data.

2.6 REGIONAL HYDROLOGY. In order to be able to accurately assess the implications of any water level management plan for Lake Phelps, it is imperative to have a firm understanding of the complex set of interrelating characteristics and principles affecting the hydrological situation in the Lake Phelps region.

At a water level between 12.0 - 12.2' above mean sea level, Lake Phelps has a surface area of 16,600 acres, and a storage capacity of 26,066 million gallons. When the water level exceeds 12.0 - 12.2', natural overflow from the lake occurs along the northwest side of the lake where the natural rim is at its lowest elevation. There are several components affecting the water budget for the lake: precipitation, evaporation, groundwater recharge, groundwater seepage, and leakage through the rim and through the canal gates. As mentioned earlier, the lake receives an average of 53.14 inches of rain per year. Obviously, this represents the predominant source of both surface and groundwater replenishment for the area. There are no natural surface streams feeding Lake Phelps, although there is an insignificant amount of overland runoff in the form of sheet flow into the lake. Evaporation is the major cause of water loss from the lake and amounts to 38.91 inches per year (based on Maysville 6 SW records, and applying a pan coefficient of 0.75). Whereas the lake is believed to be hydraulically connected to two hydrogeologic units (an unconfined, or water table aquifer, and an underlying semiconfined aquifer), groundwater inflow to the lake is considered to be of a smaller order in comparison with direct rainfalls. Under normal conditions, the lake and the groundwater system are essentially in balance. Rapid lowering of the lake level would allow groundwater discharge into the lake until the hydraulic heads attained a new state of equilibrium. Therefore, groundwater input would help maintain the lake level to a certain extent during the rainless period, but it would have little contribution in flooding the lake.

Seepage or outflow through the rim of the lake is estimated at about 2.0 inches per year, and leakage through the existing gates is about 1.0 inches annually. In combining all of these figures, in any 'average' year, water inflow to the lake exceeds water loss by 11.23 inches per year.

Yearly and monthly records of lake level fluctuation are sketchy at best. Table 3. presents the available lake level data.

TABLE 3. LAKE PHELPS WATER LEVELS
1972 - 1975

			Yearly Average		
Month	Level	1972	1973	1974	1975
	Feet msl		Feet msl		
January	11.53	11.51	11.40	10.72	11.00
February	11.36				
March	11.35				
April	11.32				
May	11.16				
June	11.03				
July	11.02				
August	10.80				
September	11.03				
October	11.08				
November	11.10				
December	11.10				

Combining the data in Table 3. with the precipitation and evaporation data presented in section 2.3, we see that the lake is at its highest level in January, and lowest level in July. July receives the most rain, sees the most evaporation; the winter months realize a moderate amount of rain and a small amount of evaporation. Thus, the lake level is relatively inversely proportional to the amount of rainfall. This fact can be explained by two possible phenomena. First, the period of accurate records for this analysis was 1972, 1974, and 1975, at which time there was less sediment buildup in the lake side of the canal gates. The gates are now leaking; they probably were at that time; so, with a corresponding higher lake level in the past few years, it would appear that the sediment is currently preventing more leakage. The second explanation is probably more feasible, and deals with the groundwater level relationships between the lake and surrounding farmlands. In that the farmlands are down gradient from the lake, during periods of water stress, (summer time) the farmland groundwater table is at its lowest point. In equalizing the hydraulic heads, the lake level would drop correspondingly. During the wet months of winter, the farmland water table is high, and due to the fact that the hydraulic heads were equalized in the summer, the lake level would rise from increased rainfall and decreased evaporation. Therefore, we can see that two of the factors helping to control the level of the lake are the position of the farmland water table in the summer and the amount of rain in the winter.

The position of the farmland groundwater table will also play an important role in the establishment of the lake level range (and the subsequent timing and amounts of flow released from the lake through the canals). With regard to this subject, the condition, capacity, and the quantity of water in the canals at any given time are important conditions. Six canals were developed in the past with the purpose of draining the lake for agricultural purposes (they are now used to drain the farmland and to control the level of the lake). In addition to calculable lake drainage flow requirements, the canals must also handle the drainage needs of the surrounding farmland in the quantities presented in Table 4.

Using general principles of groundwater hydrology together with seasonal observations of water levels and flow in the farmland drainage ditches (note the artificial drainage system illustration in the Appendix, page A.12, Book Two, the drainage hierarchy is: field ditch, collector ditch, main canal), it is possible to outline general farmland hydrological conditions. The seepage of groundwater into the ditches causes the water table to slope toward the ditches. During the summer and early fall when evapo-transpiration losses are large, the field ditches are dry near the main canals and collector ditches. Because of the close spacing of the field ditches, it is unlikely that the ground becomes completely saturated with water except possibly during hurricanes or other severe storms. During normal years, the water table probably ranges from a winter high of about 1-2 feet below the land surface to an early fall low of more than five feet below the land surface. As discussed earlier, based on the hydraulic gradient between the lake and canals, the transmissivity of the soils, and the level of the lake (in this example 10.0'), the outflow from the lake through the ground to the drainage canals amounts to 730 million gallons per year; or about 2 inches of lake elevation per year (the higher the lake level, the greater the loss).

TABLE 4. CANALS CARRYING CAPACITIES[1]

Canal	Gate 10'	Flow 11'	Capacity-cfs 12'	Capacity-lower reach-cfs	Drainage area-acres	Farmland runoff cfs	Net[2] max. lake release
Bee Tree	68	200	240	300	4300	220	80
Magnolia	22	60	70	180	2400	135	45
Mocassin	0	8	18	392	3288	180	8
Thirty foot	16	30	42	192	2890	160	30
Transportation	70	90	110	204	960	62	90
Western	55	65	75	213	810	54	65
Total	231	453	555	1,301	14,648	811	318

[1] Note page A.4 in the Appendix Book Two for the location of the canals.

[2] The maximum amount of water that can be released from the lake (at elevation 11.0') during maximum farmland drainage needs to prevent farmland flooding.

Utilizing this data, then, and for illustrative purpose using a storm intensity of 3 to 4.5 inches/day (a frequency of recurrence of once every two years), and dependent on antecedant soil moisture, Table 4. indicates that when farmland drainage needs are the greatest, the maximum amount of water that could be released from the lake to avoid major flooding is 318 cubic feet per second (cfs). This maximum is calculated at bank-full flow conditions, which may result in some flooding on the lower farmlands.

Furthermore, wind directions and velocities play an important role in determining the canals drainage capacities. During periods of northeast winds (primarily during September - November) and due to the relative absence in terrain slope, water movement in the canals slows, and sometimes stops. At these times, any flow release from the lake would definitely flood the low-lying areas.

Other than the problems described in section 2.5, the continued accumulation of lake sediment poses a threat to the maintenance of maximum possible canal flow and increases the speed of eutrophication of the lake. In the past when the canal gates were opened, sediment that had accumulated near the north shore of the lake was flushed down the canals. Recent tests have shown that the sediment settles quickly in the main canal during periods of slow flow; with the larger flows of the past, this sediment often settled in the farmland collector and field ditches (which in turn, decreased their drainage capacities). Upon completion of the necessary canal and gate maintenance, this problem could possibly be rectified. If however, new gates allowed too much sediment flow, sediment/silt fences and/or traps could be developed.

The large sediment accumulations in combination with many other factors, are currently threatening the historical and current biological and recreational integrity of the lake by accelerating the lake's eutrophication.

> Note: "The process of eutrophication is caused specifically by the supply of plant nutrients to the aquatic environment even though other factors are involved... The manifestation of eutrophication is the increasing of primary productivity, in extreme cases, the water bloom phenomenon develops and in stagnant water, oxygen supply becomes depleted. This leads to fish kills and all the other ramifications that render a recreational area useless." (Witherspoon, 1976).

The potential increased eutrophication processes at Lake Phelps can be divided into three cause/effect categories: 1) the mixing of the nutrient rich sediment, 2) the condition of rim/shoreline septic tank nitrification field nitrogen rich effluent leaching into the ground water - lake water, and increased land clearing which allows more wind eroded nutrient rich (from fertilization) farm soil to be added to the lake sediment deposits, and 3) the buildup of sediment along the north shore which is slowly altering the hydrologic conditions of the shoreline cypress community. To summarize points 1 and 2, which are discussed in detail in Part E of Book Two:

1. Algae species present in the lake sediments are capable of producing a widespread algae bloom, although the level of population found in 1976 was not critical.

2. Algae species are found in the highest levels of population with the deepest sediment accumulation on the north and northeast side of the lake. The sediments are a nutrient sink for the algae, containing noticeably higher levels of phosphate than any other part of the lake.

3. The untimely removal (when water temperatures exceed 53.6°F) of the sediment accumulations could possibly trigger increased algal growth in the lake.

4. Agricultural farming techniques that create dust clouds from the fertilized fields that settle in the lake or are washed down with rainfall, and the run-off from septic tanks (when the lake level exceeds a certain elevation) on the south and west side of the lake could very well be a big source of the small, but significant nutrient increase in the lake.

With regard to point 3 (change in the cypress stand hydrologics), increased and unmaintained sediment accumulations have two basic effects. First, during periods of high water and heavy winds, sediments are transported into the cypress lowlands and then settle out. Secondly, the deposition of the sediments along the shore are forming a dike during periods of low water (dry sediment forms hard, impervious clumps). The overall consequence of these two effects appear to be gradually changing the periodic hydric-xeric regime to increased xeric conditions. This subject will be discussed in further detail in the following section (Section 2.7 - Flora).

With the data base presented in this section, it is now possible to calculate the mechanics (not impacts) of lake level control. Lake level modeling conducted by H. Tang (NRCD - Division of Environmental Management) utilized three lake level target elevations: 11.00', 11.25', and 11.50' above mean sea level (lake level modeling and target elevations take into account all of the different variables, such as amount, timing, duration, and frequency of rainfall; farmland drainage needs, canal and gate capacities, evaporation, seepage, etc.). Table 5. presents the results of this modeling:

TABLE 5. FREQUENCY OF LAKE LEVEL EXCEEDING 12.00' MSL
AND FALLING BELOW 10.50' MSL

Target Elevation Feet msl	Above 12.00' msl Recurrence	Above 12.00' msl % Time	Below 10.50' msl Recurrence	Below 10.50' msl % Time
11.00'	0/22	0.0	14/22	10.8
11.25'	1/22	0.04	7/22	3.6
11.50'	5/22	0.5	2/22	0.7

1. The recurrence numbers are read as, for example 0/22, at a target elevation of 11.00', the lake level would exceed 12.00' zero times in 22 years.

This table indicates that for lake level targeting at 11.00' msl, the lake level would not exceed 12.00' msl based on 1955-1976 rainfall records, but it would fall below 10.50' msl more than every other year. The worst situation would be when the 1957 rainfall patterns repeat (drought). The lake level would fall below 10.50' msl for 155 days from June 23 to November 24, with the lowest elevation falling below 10.00' msl. For the 11.25' msl target elevation, the lake level would only exceed 12.00 msl once in 22 years for a duration of 3 days, and it would fall below 10.50' msl seven times in 22 years. The duration would be 81 days for the aforementioned 1957 situation. For the 11.50' msl target elevation, the frequencies would be five times in 22 years (exceeding 12.00' msl) and twice in 22 years for below 10.50' msl (however, the durations for the two extremes are approximately equal). Please consult the Appendix of Book Two pages 27-47, A.11, A.13, A.14, A.16, A.28 for supplemental hydrology data.

2.7 FLORA. There are two primary forest communities located on the Lake Phelps rim: the evergreen shrub community which extends around the entire northern, western, and southern portions of the lake; and the bald cypress forest in the north and northeast side of the lake (Note the vegetation map in the Appendix Book Two on page A.18). Due to the fact that the integrity and succession rate and direction in the evergreen shrub community at this time is more directly related to the form of human activity/ disturbance on the rim; and that for the bald cypress forest are more strongly related to the Lake Phelps water level, this section will concentrate on the bald cypress forest community.

The largest area of this forest type (named the Lake Phelps Natural Area) is a 40 acre tract bounded by SR 1166 to the north, 30-foot canal to the east, western canal to the west, and the lake to the south. The natural area, which is approximately 350 feet in width, and 3 miles in length, is a remnant of the extensive wetlands which once surrounded Lake Phelps. The dominant species in this type is bald cypress, and other canopy species include sweetgum, red maple, swamp black gum, and tulip poplar. The subcanopy and shrub strata do not contain a dominant cover, and are represented by paw paw, holly, red bay, pepperbush, Virginia tea, and spicebush.

The shoreline of the cypress swamp is gradually being built up by the lake sediments pushed by the prevailing south-westerly winds. This accretion may result in an organic levee similar to one on the east shore of Great Lake in the Croatan National Forest. This levee is presently covered with a sweetgum dominated forest and only a few cypress along the shoreline.

In considering the effect of water level fluctuations on plant community composition, it is helpful to examine past evidence of such changes at Lake Phelps. Wilson (1974) noted that there must have been a previous higher water level due to the presence of cypress knees quite distant from the trees now growing along the shore. Conversely, for cypress to germinate, a low water level and moist soil are necessary. Furthermore, the distinct distribution of cypress size classes may indicate that the level changes have been extreme and not gradual.

The four dominant species, bald cypress, sweetgum, swamp blackgum and tulip poplar have varying regenerative abilities in the swamp environment. Bald cypress produces an adequate amount of seed each year, and as mentioned, requires a moist, but non-inundated site for seed germination. Whereas, the cypress seedling can grow up to 1 foot high during the first season, (germination in late summer) it is shade intolerant, and must grow enough to avoid long term canopy inundation. Swamp black gum is very similar to bald cypress. Both sweetgum and tulip poplar are less resistant to flooding; both are shade intolerant (less so than cypress and blackgum), and both require dry sites for seed germination.

If one assumes the lake level is permanently lowered, a number of changes in community composition will take place. Areas in the draw down zone will be gradually invaded by red maple and sweetgum. Cypress seedlings will be outcompeted in these drier areas, however, near the new shoreline, the swamp forest will be able to expand if enough soil is available. If one assumes the lake level were permanently raised, the bald cypress would invade the hardwoods to the upper limit of inundation for the majority of the growing season (provided there was a drought period in the summer or fall). The existing cypress will persist, but with the increased water level, seedlings may not germinate. The result would be a non-reproducing stand of cypress which would give way to aquatic species or highly water tolerant shrubs and trees. The overall community would therefore decrease in size with cypress invading inland and the original cypress eventually becoming a senile stand.

It is apparent that the degree to which flooding will be reduced or increased is going to dictate the future vegetational composition of the natural area. The very narrow shoreline configuration makes the swamp forest particularly vulnerable to change of this nature. An increase in water level will decrease the natural area width and expand cypress dominance inland. If the water level were lowered, the natural area will increase in width and hardwoods and associated vegetation will invade the cypress toward the shore. Cypress will expand toward the lake on the shallower lake terrace.

Due to the lack of an adequate reference line/elevation survey at the time of this writing, it is impossible to establish an optimum lake level range for maintenance of the swamp forest. However, any significant deviation from the historical normal lake fluctuation patterns would produce significant adverse vegetation impacts.

According to the N. C. Natural Heritage Program, due to a lack of definitive vegetation research in this area, only one rare or endangered plant species has been identified in the lake region. The spotted pipewort (Eriocalon pellucidum) which is found in the state owned parcel on the south side of the lake, will not be affected by any water management plan. Please note the Appendix of Book Two, pages A.30 - A.32, for a listing of the Pettigrew State Park and lake rim vegetation.

2.8 FAUNA. Regardless of the final lake level range that is determined, there will be little, if any impact on the Lake Phelps region terrestrial wildlife population. Therefore, this section will concentrate solely on the Lake Phelps fishery situation.

The fishery habitat of Lake Phelps may be partitioned into two distinct communities. The flooded woodland/aquatic macrophyte community exists around nearly all of the lake perimeter. This community is made up of two subcommunities; one being an area of the flooded bald cypress forest (which may be flooded for a distance of several hundred feet from the lake's edge), and the other a band of aquatic macrophytes (extending into the lake for fifty to seventy-five yards). This community is the most important at Lake Phelps, and it supports an abundance of game and forage fish (game: largemouth bass, bluegill, pumpkinseed, white perch, black crappie, chain pickerel; forage: killifish, darters, shiners, and juvenile game fish).

The second distinct community is the sand/mud bottom community which comprises most of the barren mid-lake bottom. This community offers very little value as fishery habitat due to lack of cover, structure, or relief. Schools of white perch are present in this area during daylight hours; however, gill nets placed along outer edges of the plant beds were repeatedly seen to have high catches of white perch just after sunset (indicating a diurnal feeding migration to the plant beds and therefore demonstrating a dependency on the aquatic macrophyte community).

Maintenance of a maximum fishery population hinges on the protection of spawning and rearing areas, food sources, and escape cover. The need for these entities vary seasonally. During the months of December through mid-February, no known fish spawning occurs, and due to slowing of metabolic rates, predator-prey interactions occur with much less frequency than during the summer months (thus reducing the need for food and cover). During the months of March through November, spawning and feeding activity within the community is at its highest rate. It is during these periods that inundation of the flooded woodlands/aquatic macrophyte community is absolutely critical to maintain the largest possible fish population. As water level drops from this optimum level (11.50' msl), the available amounts of food would decrease, thus decreasing population sizes.

The release of water from Lake Phelps in addition to water in the canals draining the adjacent farmlands (which ultimately drains into the Scuppernong River) play an important role in another fishery resource. The Scuppernong River has supported a significant commercial pound net fishery for river herring (blueback herring and alewife) for many years. During early spring, spawning takes place in the upper river reaches and in the Lake Phelps region drainage canals. The N. C. Division of Marine Fisheries has proposed the placement of an anadromous fish ladder on Bee Tree Canal near the existing gate. Their objective is to allow the access of the herring and alewife to the lake for spawning. Game fish populations of the lake would benefit from the presence of the young-of-the-year herring as a forage species, and the commercial fisheries would benefit by creating an additional 16,600 acres of spawning and rearing areas. For this situation to work, there must be an attractant flow of water in the canals to mid-May; a flow of water over the fish ladder during this period; and also an opening of the canal gates during October and November (to allow the herring and alewife to return to the Scuppernong).

Therefore, to create new fishery resources and to maintain current populations, there must be a flow of water from the lake during February, March, April, May, October, and November; and the lake level should be maintained as close to 11.5' msl as possible from March to October.

In addition to the documented important game and forage fishery resources of Lake Phelps, the lake provides habitat for Fundulus waccamensis, the Waccamaw killifish. This small, minnow-like fish is in the process of being nominated by the U. S. Fish and Wildlife Service to the federal rare and endangered species listing. Although this fish has been sighted numerous times at Lake Phelps, its official existence has not yet been established. Nonetheless, the Waccamaw killifish feeds primarily on benthic crustacea and insect larvae. The killifish spawning aggregations appear to be associated with aquatic vegetation. In order to maintain the Waccamaw killifish population at Lake Phelps, it is imperative that the lake water level be maintained at a level as high as possible so as to preserve the aforementioned band of aquatic macrophyte vegetation which is so important to the killifish.

2.9 RECREATION. Providing extensive opportunities for freshwater, water-based outdoor recreation, Lake Phelps and Pettigrew State Park provide one of the major supplies for such activities in this region. Indicative of the important recreational environment of the lake, and the relative lack of similar opportunities in the region, use figures for the park are increasing steadily. Between 1974 and 1976, boaters accounted for an average 28.2% of total park use, fishermen accounted for 29.1%; for a total average of 55.8% of total park use.

In view of the rapidly increasing use pressures being placed on the park, and the relative lack of supporting facilities, in April, 1977, the NRCD - Division of Parks and Recreation - Master Planning Unit began preparing the master plan for additional land acquisition and facility development for Pettigrew State Park. After several public meetings and comprehensive resource analysis, the plan was finalized in July, 1977.

This master plan calls for the development of two major use areas: 1) Big Point Access Area, located to the west of the existing park, and east of the area of natural overland flow from the lake, would be developed as the major day use area, and 2) Pettigrew Access Area, in the area of the existing park, would be developed as a day use and overnight use. Included in the development plans are proposals for four boat launches, courtesy piers, boat docks, two fishing piers (one with a boat rental), and a swimming beach. Sediment movement patterns, lake bottom slope and depths, and normal lake fluctuation played a critical role in the siting of these facilities. As such, the facilities were designed with a lake level target elevation set at 11.5' above mean sea level. Therefore, due to the location, amount, and movement of sediment, in combination with the gentle slope of the lake bottom, any significant deviations of the lake level from the normal fluctuation will result in severe impacts if the facilities are built as designed. High water would flood the facilities; low water would create a large land base between the shoreline and the facility. Either situation would render the facilities unusable. If the facilities were to be designed to handle a wide lake fluctuation, or a lower lake level, construction costs would increase significantly (primarily resulting from increased dredging made necessary in order to gain an adequate depth of water).

3. THE ENVIRONMENTAL IMPACTS RESULTING FROM VARIOUS LAKE LEVEL MANAGEMENT ALTERNATIVES

3.1 TERMINOLOGY DEFINITION. The terminology used in this section is the same as was used by the U. S. Department of the Army - Corps of Engineers in the Final Environmental Statement - Improvement of U. S. 321 Highway, Blowing Rock to Boone, Watauga County, North Carolina. This terminology is defined as follows:

LEVEL OF SIGNIFICANCE:

STATEWIDE - the impact is of statewide importance. The environmental resource (flora, fauna, habitat, population, community condition, etc.) is rare, unique, endangered, or unusual in occurrence or quality with respect to the State of North Carolina.

LOCAL - the impact is of local importance. The environmental resource is of high local importance. The environmental resource is of high quality and/or has high use value with respect to Washington/Tyrrell Counties.

TYPE OF IMPACT:

ADVERSE - the impact is damaging or harmful to the environmental resource. The resource is lost or its quality degraded.

BENEFICIAL - the impact is such that the environmental resource is improved, undesirable characteristics are removed, new attractive resources are created, or outstanding resources are protected.

DEGREE OF IMPACT:

HIGH MAGNITUDE - would result in the permanent loss, or severe long-term degradation of the resource with no practical prospect for recovery, or would result in significant, permanent improvements in the quality of the resource, removal of undesirable characteristics, creation of new attractive resources, or protection of existing high quality resources.

MEDIUM MAGNITUDE - would result in a significant degradation of the resource that would require extensive effort and/or time for recovery or will result in a permanently lower level of quality; or would result in the complete change in overall characteristics while still achieving a significant net-benefit or will result in a marked improvement in the resource due to the project while retaining the basic characteristics of the resource.

LOW MAGNITUDE - would result in a short-term degradation of the resource but recovery can be affected by appropriate management resources or recovery will occur naturally in a relatively short time; or would result in a minor net benefit due to enhancement of the existing resource or modification of the resource to a new form.

3.2 NO ACTION - NO LAKE LEVEL MANAGEMENT. Of all the alternatives that will be discussed in this section, a no action alternative would most probably result in the highest quantity of adverse short-term and long-term environmental impacts per unit of beneficial impact. In essence, a no action alternative could take form in one of two ways. The first form would entail that no lake level management be employed at all. The lake condition would be treated as it was in the early 1780's prior to Josiah Collins and the Lake Company's canal development. The second form would entail the opening of the gates only when the potential for lake flooding became imminent. As soon as the flooding danger passed, the gates would be closed. The net difference in results from adoption of either of these forms would be insignificant.

Final adoption of a no action-no lake level management alternative would result in the following impacts:

* the lake level would be influenced almost exclusively by precipitation patterns. The lake would be subject to flooding, and to long periods of low water due to droughts. This would not significantly impact vegetation or wildlife on a short-term basis (in view of the biological condition of other North Carolina bay lakes with no lake level management and the similar condition of Lake Phelps.) However, from study of the documented eutrophication of these other bay lakes, it is obvious that eventually, as a result of sediment buildups and increased nutrient levels in the sediment, Lake Phelps would eutrophicate and become a bog-pocossin (though it may take several hundred years).

* periods of high water would continue the wind/wave/water erosion of private property on the lake rim. High water levels would cause rim sewage disposal systems to malfunction (while impacting private residents, and also causing a deterioration of lake water quality.)

* adjacent farmland would be subject to flooding when the lake reached high water, thus possibly accruing significant ecological and financial losses.

* there would be times when the Pettigrew State Park recreational facilities would be unusable, thus placing a severe limiting factor on the State's responsibility to provide adequate recreational opportunities.

* the buildup of sediments on the north shore and the lack of canal flushing of these sediments would significantly increase the maintenance and management costs at Pettigrew State Park.

In view of the potentially high quantity of environmental costs and relative lack of benefits that would result from the implementation of a no action-no lake level management alternative, this alternative is not viable in the context of today's world.

3.3 LAKE LEVEL MANAGEMENT TO MAXIMIZE RECREATION BENEFITS. This alternative would involve maintaining the lake level as close as possible to the 11.50' above mean sea level target elevation during the summer (high use) months. Whereas the water requirements for recreation are somewhat similar to those for wildlife, the resultant impacts from establishing this lake level for recreation will likewise be generally similar. By maintaining a high lake level during the summer - high use months, several significant impacts would result.

First, as a result of a high water level during August - September (periods when the cypress needs moist soil for germination), the cypress would invade the hardwoods in the upper regions of inundation, and the existing stand would be non-producing (in its present location). This would ultimately decrease the size of the natural area. This would also eventually decrease the size of the flooded woodland/aquatic macrophyte community, thus decreasing the fish population size. Second, with high water in late summer, there would be a corresponding decrease in lake water storage capacity, which in turn would increase the potential for hurricane/tropical storm flood damage to rim and farmland property owners. Third, in order to achieve a high water level for the summer, it probably would not be possible to release water in the early spring. This would adversely impact the commercial fishery of the Scuppernong. Finally, as a result of the high water, the subsequent lack of adequate storage capacity, and the historic heavy rainfalls of July and August, there will be times when the 11.5' designed recreation facilities will be flooded and thus not usable, if not damaged. Although the water level at this level would generally benefit recreation and wildlife resources, the potential adverse impacts resulting from flooding mitigate these benefits so as to decrease the viability of this alternative.

3.4 LAKE LEVEL MANAGEMENT TO MAXIMIZE WILDLIFE BENEFITS. This alternative would meet the water requirements discussed in section 2.8, namely, the release of lake water during February, March, October and November, to allow the blueback herring and alewife lake access and egress for spawning, and the maintenance of high water levels (to approach 11.5' msl) from March to October for maximum desirable resident forage and game fish habitat. As mentioned earlier, implementation of this alterntive will accrue impacts similar to those discussed in the previous section. Furthermore, the water release requirements in late winter-early spring will increase the flooding impacts of the lowland farmlands. This time period would be that when the ground water table level is the highest in the farmlands, the amount of rainfall is increasing, and the canal network is needed for draining the farmland (farmers begin cultivation in March and require fairly dry land conditions). One additional impact, which was not discussed in the previous section regards the state's ability to maintain the lake at a high level during the summer months. Section 2.6 indicated that the lake is at its lowest elevation during the summer months under natural (no canal gate opening) conditions. Therefore, to counterbalance evaporation and ground water table losses, water would need to be pumped into the lake. (In order to raise the lake ½ inch, five wells to the Castle Hayne aquifer pumping at a rate of 1,000 gallons per minute for 30 days would be necessary). This solution is both ecologically and financially unfeasible. Whereas, the benefits to be derived from a high lake water level in the summer months with regard to recreation and wildlife are numerous, the potential adverse environmental impacts counterbalance the benefits, thus undermining the feasibility of this alternative.

3.5 LAKE LEVEL MANAGEMENT TO MAXIMIZE FLOOD PROTECTION BENEFITS. This alternative would involve the establishment of the lake level at a target elevation of 11.00' msl or below. As was indicated in section 2.6, such a level would result in the lake exceeding 12.00 msl none of the time, but the level would fall below 10.50' msl fourteen times in 22 years (10.8% of the time). During drought conditions, this under 10.5' msl duration would be as long as 155 days (from June 23 to November 24.)

The utilization of this alternative would obviously eliminate some of the adverse impacts associated with the alternatives already discussed (namely, the flooding of the lowland-impacts). However, in order to gain an adequate amount of flood storage capacity, the normal fluctuation levels of the lake would be lowered considerably, thus, the lake would be at a low level for a long period of time during the summer months. This would create several long-term, high magnitude adverse environmental effects with regard to recreation, wildlife, and vegetation. Whereas, the master plan for Pettigrew State Park was designed for a lake level of 11.5', and the bottom of the lake slopes very gently, a significant, long-term drop of the level of the lake below 11.5' would greatly increase the amount of dredging that would be necessary to maintain the maximum utilization potential of the boat launches,docks, and swimming beach. Continued periods of low water would change, and speed up the succession rates of the bald cypress forest. The existing forest will be invaded by hardwood seedlings, and the cypress could possibly become established near the new shoreline.

With the removal of the water from the flooded woodland/aquatic macrophyte community, game and forage fish populations will be reduced significantly. If the aquatic macrophite vegetation does not become established at the lower lake level, there could be a permanent reduction of the value of this important biological and recreational resource. Maximization of flood benefits would create many significant, long-term adverse environmental impacts.

3.6 LAKE LEVEL MANAGEMENT TO MAXIMIZE VEGETATION BENEFITS. Whereas the maintenance of a maximum fishery population is so strongly related to the condition of the shoreline vegetation, lake level management for vegetation would, in in most cases, produce predominantly the same benefits and impacts as management for wildlife. However, in order to keep the lake level as high as possible during the summer (period of historical low lake levels) no water release would be allowed during the spring months. Depending on the amount of farmland drainage (and subsequently the amount of, and velocity of the water in the canals), the anadromous fishery situation could be adversely impacted. Nonetheless, as a result of no water release in the spring, the blueback herring and alewife populations would be denied the excellent spawning opportunities Lake Phelps has to offer.

Generally, in order to maximize the vegetation benefits, the historical lake fluctuation patterns would be closely modeled. In turn, there would be the potential for some flooding and/or low lake levels, which would produce other related impacts with regard to the Lake Phelps recreational environment.

Upon the conclusion of study of the benefits and adverse environmental impacts related to the five alternatives presented in this section, it should be clear to the reviewer that none of these alternatives would produce an acceptable amount of benefit per unit of environmental cost. Therefore, what is needed is an alternative that would treat recreation, wildlife, flood protection, and vegetation components as equal entities. The resultant alternative should produce near equal benefits, as well as near equal impacts per each study component.

3.7 LAKE LEVEL MANAGEMENT TO EQUALIZE ALL BENEFITS AND ALL ADVERSE ENVIRONMENTAL IMPACTS. Detailed analysis of the resource analysis sections, and the preceeding alternatives has led to the development of a compromise management alternative that would decrease the maximum attainable benefit per any study component (ie. wildlife, flood protection, etc.), while at the same time significantly decreasing the magnitude of the maximum resulting adverse environmental impacts on these components. It should once again be noted that lake level elevations presented in this section represent maximum/minimum acceptable levels, and do not necessarily represent attainable levels. Management decisions in this document are based on short-term, average data and obviously, when dealing with such a natural force as weather (which plays a dominant role in establishing the lake level) extremes must be expected.

This alternative would declare the optimum (desirable) lake level to range between 11.0' msl to 11.5' msl (please note the introduction for terminology defintion). Extreme cases would cause the lake level to fall below 10.5' msl two times in 22 years for an average duration of 6 days per time; and the lake level would exceed 12.00' msl five times in 22 years for an average duration of 9 days. This lake level establishment would require the release of 350 cfs when possible (when the farmland does not need the canals for drainage). Table 6. illustrates three computer modeled rainfall/lake level situations based on historical rainfall data.

Use of this alternative will produce several adverse environmental impacts; however, the impact magnitude and duration per any resource component will be significantly less than the impacts described for the other lake level management alternatives. Insofar as a comprehensive in-house Division of Parks and Recreation decision making process has selected this alternative as the most acceptable in terms of equal benefits/equal cost per each resource analyzed, the remainder of this document will concentrate solely on this alternative and thus, efficiency demands that a superficial analysis of this alternative's impacts should suffice for this section.

TABLE 6. MODELED LAKE PHELPS WATER LEVELS WITH VARIOUS RAINFALL INTENSITIES[1]

	Lake Level (Feet above msl)		
Month	1970-Low Rainfall 36.40"	1958-Avg. Rainfall 51.90"	1960-High Rainfall 59.45"
(Start Elevation)	11.49	11.34	11.39
January	11.48	11.47	11.49
February	11.49	11.48	11.76
March	11.43	11.49	11.47
April	11.42	11.45	11.38
May	11.29	11.42	11.23
June	11.01	11.28	11.24
July	11.08	11.19	11.25
August	11.05	11.22	11.44
September	10.88	11.36	11.65
October	10.69	11.48	11.43
November	10.64	11.41	11.37
December	10.59	11.39	11.33
(End Elevation)	10.74	11.49	11.35
Avg. Yearly Elevation	11.09	11.39	11.42

1 - Target Elevation 11.5' msl, 350 cfs release,
1955-1976 Rainfall Data

Instilling the management techniques that were used as independent variables in the modeling systen (ie: flow release of 350 cfs, monitoring of farmland drainage needs prior to water release, optimum lake levels etc.) for years of large amounts of rainfall, and years of average amounts, the amount of lake level fluctuation can be maintained in a tight range. Years of below average amounts of rain will necessitate the careful monitoring of the lake level to prevent it from falling below the 10.4' msl low lake level. As a result of this control, (for average situations) water levels can be maintained at a relatively high level in the summer months. Although not as high as was desired for maximum recreation, wildlife, and vegetation benefits, this level will permit adequate storm flood storage. Nonetheless, as a result of a slightly lower level than desired, there will be some short-term, low magnitude adverse environmental impacts: master plan waterfront facilities will require additional dredging (the beach area will need to be expanded); there will be a slight reduction of flooded woodland/aquatic macrophyte habitat, and a corresponding slight decrease in current resident game and forage fish population size. Furthermore, there will be a chance of some lake flooding; however, the frequencies and durations will be of an insignificant nature. On the other side of the coin, water can be released to allow the proposed fish ladder to function and thus allow lake access and egress for the herring and alewife, the lake will not significantly contribute to farmland flooding in the spring months, and the potential for flooding of rim property owners' sewage disposal systems and residences can be practically eliminated.

4. THE ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

4.1 LAND USE. The proposed action - lake level management plan will, overall, produce very few short-term, low magnitude, local, adverse environmental impacts with regard to regional land use. Although the lake level fluctuation range has been set so as to provide adequate normal-storm flood storage capacity, there is the remote possibility of lake flooding during extreme cases. The duration of this flooding would be about nine days, and the probability of occurrence is once every 4.4 years. During this flood period, the areas of natural overland flow on the north side of the lake would flood first, but due to the size of the vegetation buffer and the location of major drainage ditches in this area, there would be no overland farmland flood flow. Those structures on the rim at an elevation less than 12.2' above msl, and any septic tanks/septic tank nitrification fields below this level would possibly receive some flood damage.

Furthermore, there is a chance for some short-term lowland farmland flooding. However, the amount, duration, and frequency of this flooding will be considerably less than presently occurs, less than would occur from implementation of a no action alternative and less than what would occur from implementation of several of the other alternatives. Furthermore, based on the computer modeling of the lake level, any farmland flooding would occur at times when crop and or farm operations are the most tolerant of flooding.

The proposed action will not cause the displacement of any people or businesses, nor will it affect settlement patterns or regional land use trends.

4.2 HYDROLOGY. The massive amount of vegetation clearing and drainage canal development in the region over the last 25 years have impacted the regional hydrology much more intensely than practically any Lake Phelps Lake level management plan would. Furthermore, as was noted in Section 2.6, the massive canal development (and the resultant lowering of the groundwater table and faster movement of water out of the system) has, for the most part, played a more important role in affecting any given lake level than the lake level affecting the groundwater table.

Practically the only effect lake level managment will have on regional hydrology will result from flow releases from the lake. Care will be taken to not exceed the canals carrying capacity during periods of excessive farmland draining needs, Scuppernong River wind tide canal water backup, and northeast wind upland canal water backup. The hydrological benefits (to be discussed in Section 5) resulting from the management plan clearly outweigh the relative lack of environmental costs.

4.3 FLORA. Unfortunately, there have been no surveys conducted to determine how much shoreline would be exposed or flooded as a function of human manipulation (eg. how many feet of shoreline would be exposed if the lake level were lowered x inches). This fact combined with the numerous variables of rainfall, evaporation, wind driven waves, etc.

makes a quantitative estimation of the impact on the vegetation of the natural area virtually impossible. The only realistic conclusions which can be drawn are general successional trends based on scientific knowledge applied to the community in question. Upon implementation of the management plan, the subsequent adverse vegetation environmental impacts will be of a low-magnitude, short-term nature. Insofar as the lake level management plan will cause the lake to fluctuate predominately in its natural historical pattern, and this fluctuation will be in a fairly tight range, the overall effect will be the maintenance of the bald-cypress forest in its current condition. During the late summer when the lake is at its lowest level, there may be a slight reduction of the aquatic macrophyte community. However, this reduction will be of short duration, and will not be of a significantly higher magnitude than has happened naturally in the past. The proposed action will not adversely impact any identified rare or endangered vegetation species.

4.4 FAUNA. The proposed lake level management plan will not adversely impact the fishery resources of Lake Phelps or the Scuppernong River. In fact, the overall effect will be of a long-term high magnitude beneficial impact. Nonetheless, as was just discussed, during the late summer there will be slight reduction of the aquatic macrophyte community which in turn might result in a slight reduction in total forage and game fish population size. Again, the duration and magnitude of this reduction will not be significantly greater than has occurred naturally in the past. The Waccamaw killifish and any other known rare or endangered wildlife species will not be adversely impacted by the proposed action.

4.5 RECREATION. The predominant adverse impact on recreation resulting from implementation of the management plan will be financial in nature. Not only will some of the facilities proposed for Pettigrew State Park need to be redesigned so as to be fully operable at a lower lake level, but also the dredging for the boat launches will need to be extended. The redesign of facilities, the increased dredging, and the additional facility tolerance necessary for a lower lake level will increase the cost of Pettigrew State Park master plan implementation.

Furthermore, with the additional responsibilities placed on the Pettigrew State Park Staff resulting from management plan implementation, there will be a corresponding and significant increase in park management and maintenance costs.

5. BENEFITS TO BE DERIVED FROM THE PROPOSED ACTION

Review of the previous section indicates that in a relative sense, there will be a minimal, insignificant amount of adverse environmental impact resulting from implementation of the Lake Phelps Lake Level Management Plan. Furthermore, the foreseeable impacts are equitably distributed among the resource components studied.

On the other hand, the management plan will create and perpetuate many diverse benefits, not only per the ecological integrity of the lake and its environs, but also to the social welfare of the region. Due to the complex set of ecological - recreational - social interrelationships reacting in the Lake Phelps region, and thus the corresponding complex set of benefits resulting from an action affecting these components and relationships, efficiency dictates that the predominant benefits be presented in list form. The major benefits that will be realized from implementation of the Lake Phelps Lake Level Management Plan will be:

LAND USE:

* net decrease in flood amount, duration, and frequency (both farmland flooding from canal overflow, and rim property lake overflow.)
* net decrease in property and structure damage from decreased flooding.
* decrease in the probability of rim septic tank-septic tank nitrification field malfunction, and thus, less chance of ground water and lake water pollution.
* less chance of spring farmland flooding from knowledgeable and controlled flow releases.
* more water in the canals during the summer, thus a higher local water table; a benefit to agricultural production.
* the assurance that the Lake Phelps ecological integrity will be maintained, benefiting recreation uses, wildlife, and rim property owners.

HYDROLOGY

* more constant water flow in the canals, which will reduce peak storm flow, and balance the water budget more equitably.
* higher summer lake level, which will provide a higher hydraulic head to maintain the lowland ground water table at a higher level.
* storage capacities for flood water, which will reduce the amount of erosion and sedimentation that currently occurs.

- prevention of man-induced unintentional canal water backup during periods of northeast winds and Scuppernong River tides.

FLORA:

- maintenance of the bald cypress forest, which will preserve one of the last remnants of this community type in this region.
- maintenance of the aquatic macrophyte community throughout most of the year, which will benefit fish populations, fishermen.
- the rim vegetation will be maintained which will in turn perpetuate its beneficial aspects (buffer against wind transported sediments, prevention of soil erosion, decrease seepage loss, aids flood storage, and aquifer recharge.)

FAUNA:

- will benefit the Scuppernong River fishery resources by adding 16,600 acres of additional spawning and rearing area for the blueback herring and alewife.
- increase the game fishery resources of Lake Phelps (increased biotic production, increased fishing potential).
- an overall maintenance of the current fish population size and diversity.

RECREATION

- the outdoor recreation environments of Lake Phelps and Pettigrew State Park will directly benefit from the positive impacts on the other resource components.
- as a result of maintaining and preserving the Lake Phelps ecological integrity (resulting from this lake level management plan), the outdoor recreation opportunities can best be preserved, thus serving the people of North Carolina and their visitors; providing inspiration and benefit not only for the present generation, but for generations to come.

6. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROJECT BE IMPLEMENTED

As per definition of the North Carolina Environmental Policy Act, this section is to contain an reiteration of those aspects described in section 4 which are deemed to be significant and adverse. However, as a result of a comprehensive, interdisciplinary planning approach combined with massive public input, and the preparation of the environmental impact statement prior to the finalization of the management plan, this resultant Lake Phelps Lake Level Management Plan will not produce any significant, long-term adverse environmental effects.

However, to repeat the major, but relatively insignificant adverse environmental impacts; implementation of the management plan will:

* result in the potential of widely spaced, short duration, non-critical time of the year rim property flooding and lowland farmland flooding.

* slightly reduce the quantity of aquatic macrophyte vegetation in the late summer.

* as a result of this vegetation reduction, there may be a seasonal short-term slight reduction of the current game and forage fish population size.

* increase the planning and implementation costs that will be associated with the Pettigrew State Park Master Plan, and will increase park management and maintenance responsibilities and costs.

In order to place the magnitude and importance of these impacts into proper perspective, it is important for the reviewer to remember that first, the proposed action will not increase the impacts per any resource component higher than what they are currently, and what have taken place, and second, any management plan and its associated impacts are reversible (with regard to Lake Phelps). If future analysis reveals unforeseen or additional impacts, the management plan is purposely flexible enough to allow revision so as to further mitigate these impacts.

7. MITIGATING MEASURES INCLUDED IN THE PROPOSED ACTION

Again, by definition of SEPA, this section is to discuss measures incorporated in the management plan designed to mitigate the impacts discussed in sections 4 and 6. The elaborate planning processes undertaken since the first realization of the need for Lake Phelps lake level management in the early 1970's has led to the preparation of a management plan that creates the highest amount of benefit per unit of environmental cost of all the alternatives studied. Application of North Carolina State Park and State Lake principles, philosophies, and regulations, intensive analysis and utilization of public input, interdisciplinary scientific input, multi-alternative analysis, and the preparation of the EIS at the same time as the management plan has made this possible.

In reference to Section 3, in actuality, the management plan which is a composite of the beneficial and detrimental aspects of the various alternatives studied, attempts to balance all resource component impacts and benefits. Therefore, the proposed action/management plan is the most comprehensive mitigation measure with regard to the singular high benefit-high cost aspects associated with each alternative.

Furthermore, the management plan is not an irreversible action. Based on the scientific analysis requirements inherent in the management plan (ie: continued lake level monitoring, correlation analysis, wind and precipitation monitoring, inspection of land flooding etc.),if future analysis indicates that the management plan is not totally successful in meeting its objectives, it can be readily modified.

8. RELATIONSHIP BEWTEEN THE LOCAL SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

In any natural system, during the processes of environmental component and synergism maturation and succession, there will always be periodic adverse impacts. No natural system constantly results in total beneficial aspects. Insofar as the Lake Phelps Lake Level Management Plan attempts to maintain the normal fluctuation patterns of the lake while reducing the extreme natural fluctuation range (and thus reducing the impacts associated with that range) it can be unequivocally stated that the plan will perpetuate the short-term use of the Lake Phelps environment while enhancing and maintaining its long-term productivity.

The incurrence of the various, insignificant short-term adverse environmental impacts will not be of a greater magnitude than what would occur naturally. Furthermore, the management plan will not irreversibly impact or destroy any one resource component, thus assuring the long-term perservation of the long-term Lake Phelps ecological, recreational, and social environments. The proposed action does not advocate nor produce any trade-offs between short-term environmental gains and long-term environmental losses.

9. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Perusal of Section 3 indicates that the maximization of singular resource benefits at the cost of the other resource component alternatives would irreversibly or irretrievably preclude some of the potential uses of the Lake Phelps environment. The proposed action - Lake Phelps Lake Level Management Plan will not preclude any uses of the environment, nor will it involve the irretrievable or irreversible commitment of the Lake Phelps resources.

Obviously, the proposed project does not advocate resource extraction, erosion, destruction of archaeological, geological, or historic features, destruction of endangered species habitat, or unalterable changes in land use; and thus, places no unalterable commitment on these resources.

The additional capital expenditure and time investment responsibilities placed on the State of North Carolina and the Pettigrew State Park staff necessary for the continued monitoring and study, and successful performance of the management plan may be deemed irretrievable. However, these modest investments are an important and necessary expense required for the perpetuation and use of an extremely valuable environmental, recreational and social resource.

10. CONSULTATION AND COORDINATION

Throughout the planning and environmental impact statement and management plan preparation processes, the N.C. Department of Natural Resources and Community Development, Division of Parks and Recreation has actively sought, and in return received information from many sources. On August 24 and September 14, 1978, public meetings were held in Creswell, NC in order to gain insight into the public opinions concerning water level management at Lake Phelps. Comments, questions, and responses were received, analyzed, and ultimately played an important role in the content of the management study. In the interim between the public meetings and the preparation of this document, the public continued to play a very important decision-making role. Many federal, state, and local agencies, universities, and individuals contributed data that was thoroughly analyzed and utilized in this document.

On August 10, 1979, the Draft Lake Phelps Lake Management Study was forwarded to the State Clearinghouse for the statewide public review mandated by the N.C. Environmental Policy Act. During the review process, the Division received 48 comments (reproduced on pages 51-67, and responded to on pages 38-50). On October 11, 1979, the plan was presented to the Planning and Special Issues Committee at the monthly Coastal Resources Commission meeting. On December 13, 1979, the plan was presented in Raleigh to the Washington County and Tyrrell County Boards of Commissioners and other interested citizens. On January 17, 1980, the final management plan was presented at a public meeting in Creswell, NC.

The Division is in the early stages of understanding and managing Lake Phelps. As time goes on, private citizens and groups, universities, and government agencies will play an increasingly important role in aiding the Division in being responsive to the needs and desires of the local citizens while managing the lake in an environmentally sensitive manner.

11. COMMENTS AND RESPONSES TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

11.1 DEPARTMENTAL COMMENTS. (prior to release of draft to the clearinghouse) Prior to the release of this draft certain key individuals within the Department of Natural Resources and Community Development were given the opportunity to comment. Dr. Neil S. Grigg, NRCD Assistant Secretary compiled several comments.

11.1.1 DATA ADDITION SUGGESTIONS. A description of additional flood considerations should be incorporated into this document.

11.1.2 RESPONSE. In the interest of efficiency it was not feasible to include the data addition into the main body of the text. However, the issue is of the utmost merit. Thus the following discussion will attempt to summarize these important considerations which in turn will be treated as a supplement to Section 4.3 - Hydrology (Task Force Report), Section 2.6 - Regional Hydrology, and Section 3.5 - Lake Level Management to Maximize Flood Protection Benefits.

It is recognized that farmland flooding and wet fields are significant problems at Lake Phelps and management of the water level (or lack of management) has been a factor in those problems.

Breaching, as normally considered in dam safety is not a threat at Lake Phelps. The natural lake rim slopes gently (1% to 2%) landward. Overflows would be unable to generate the high erosine velocities which usually result on dams with steep downstream slopes. Local land areas would receive some scour erosion but not to the extent causing catastrophic collapse or emptying of the lake.

Problems of local flooding and sedimentation in low areas result from two types of overflow: diffused and concentrated. At Lake Phelps, overflows along the natural rim spread into low areas and accumulate in available surface drainage facilities. The depth and extent of flooding are determined by ditch, canal and river capacities to handle surplus water. Such flooding could result in crop damage, travel disruption, water damage, and temporary abandonment of homes, businesses, schools, etc. depending on the volume and duration of lake overflow. Diffused overflow would not be expected to significantly lower the lake level unless hook-up with excavated channels were made at the lake's rim.

Sedimentation resulting from diffused rim overflow will occur from overland flow, principally from bank cutting at points of interception of ditches, canals, road beds and other local scarped areas. Sediment from the lake and erosion of the rim will not significantly contribute to the problem.

The second and most serious problem is concentrated overflow resulting from high lake water gaining direct access to nearby canals and channels. Even short-term connection could result in headcutting or entrenchment into the lake proper. If left unabated, this could result in large volumes of water and sediment coursing along the channel to lower areas. Depending on downstream channel capacities and flowage conditions this additional water could cause serious flooding and sediment problems in low areas. Although the classic dam-breach floodwave would not develop, the quantity of water and sediment removed from the lake would be governed by the receiving channel capacity near the lake.

From the limited study to date it is impossible to assess the probability of this particular problem occurring. However, given current gate and canal conditions, real potential for structural failure exists. Mocassin Canal and Western Canal are in the poorest condition and the potential exists at all water control structures and at Stinking Gut Slough.

The following table indicates wave height at Lake Phelps with sustained winds of various velocities.

TABLE 7. LAKE PHELPS WIND/WAVE RELATIONSHIPS

Wind Direction	Fetch (miles)	Wind Velocity (mph)	Wave Height (feet)
N-S	4.2	15	0.8
		25	1.3
		50	1.9
NW-SE	6.7	15	.9
		25	1.3
		50	2.0
E-W	7.4	15	1.0
		25	1.4
		50	2.1

The direction of the wind has no bearing on wind velocity but is a function of storm patterns and frequencies.

The effects of wave height on rim overflow will vary around the lake with the extent of extremely shallow water, supporting vegetation, the extent and density of tree stands and other vegetation. For specific locations, detailed studies of a comprehensive nature on the site would be needed.

The elements causing lake overflow are rainfall and wind velocities. There are times when one element alone or in modest combination with the other will not be great enough to cause overflow. At other times, depending on lake level, either could trigger overflow. Rainfall occurrence probability is determined by analysis of historical record.

To anticipate the pattern of rainfall and wind events in relation to each other is most difficult. The cumulative effects of one with the other must be considered. For example, if Lake Phelps underwent a storm with a 50 year rain of 8.5 inches and a 50 year wind of 50 mph the lake stage would rise about 2 feet. Depending on wave dissipation among trees, other vegetation at any point of consideration, and the existing lake elevation, the rim would be tested for overflow. With the aforementioned storm and a lake level of 11.0 feet (N-S wind), overflow would occur in the low area of the rim on the north lake shore. To determine the extent of overflow, the amount of resulting damage, recurrence possibilities and corrective steps at any location along the rim would require considerable additional investigations, surveys and study.

It is anticipated that large sums of money would have to be expended in order to study, review and calculate precisely the potential monetary flood damages on the properties around the lake. A study of such magnitude at this time is not recommended because most of the structures at the south shore of the lake would not be flooded except under extreme events.

11.1.3 SUGGESTED FUTURE PROCESSES Dr. Grigg suggested several processes that should be conducted in the future at Lake Phelps. The Office of Water Resources (NRCD) should be asked to develop refined operating rule curves and strategies for the operation of Lake Phelps based on continuous study and updating as more data becomes available. The OWR should be asked to retain continuous responsibility as consultant to Parks and Recreation for the purpose of improving the lake operation. The services of the Lake Phelps Advisory Committee should be incorporated with the efforts of the OWR, as well as the local soil and water district, and the counties involved in this effort.

The issue of preventing farmland from excessive flood damages should continue to be addressed by the Soil Conservation Service, NRCD, the Lake Phelps Advisory Committee and the soil and water districts in the area.

11.1.4 RESPONSE The suggestions listed above will be followed in addition to the completion of a suggested engineering study (which further addresses questions of flooding at Lake Phelps).

The Division of Parks and Recreation will have an engineering study conducted which will establish needed improvements on the water release system at Lake Phelps. The general objective of the engineering study will be to determine the remedial measures necessary to fully develop the hydraulic capacity of the existing Lake Phelps outflow structures. These include all hydraulic structures located at the outlet points and in the canals, all the way to the final discharge points on the Scuppernong River. The work to be performed shall include, but not be limited to:

1. A thorough and comprehensive hydraulic and structural analysis of the Lake Phelps water control structures. The results of this analysis must be reported in a written document, complete with maps and drawings, which describes:

   a) The existing capacities of all gates, canals and control structures, expecially considering critical points where capacities may be limited such as at culverts; and

   b) The maximum feasible capacities which could be developed if appropriate replacement, improvement and maintenance activities were undertaken.

2. A thorough and comprehensive analysis of the adequacy of road access to the water control structures.

3. An engineering analysis of the specific construction activities needed to upgrade the capacities to their maximum levels including:

   a) Recommendations for remedial actions to correct deficiencies in canal capacities;

   b) Recommendations for replacement of gates and control structures;

   c) Cost estimates for each structure or remedial task;

   d) Recommendations for maintenance programs to accompany any new construction;

   e) Sketches and preliminary working drawings as necessary to discuss the work with potential contractors and to determine the sizes, locations and elevations of all structures and improvements;

   f) Description of the most effective contract procedure in which the work should be accomplished.

This study with its ensuing report shall be accomplished within 30 calendar days and shall be submitted to Mr. Sammy Thomasson, Deputy Director, Division of Parks and Recreation.

Special Note: As of February 1, 1980, the data requirements recommended in section 11.1.4 Response have been completed. The Lake Phelps Water Release Systems Study (engineering report) NCP-7901 of September 1979, by Pridgeon Consultants, Inc. (New Bern, N.C.) is on file at the Division of Parks and Recreation administrative offices in Raleigh, and the Park Office at Pettigrew State Park.

11.2 STATEWIDE REVIEW COMMENTS (received after release of the draft to the clearinghouse) The Division of Parks and Recreation received comments on the draft document from the following agencies:

Agency	Comment Number
N. C. Department of Justice-Attorney General's Office	1-5

N. C. Department of Natural Resources and Community Development-Washington Field Office	6-16
N. C. Department of Natural Resources and Community Development-Wildlife Resources Commission	17
N. C. Department of Natural Resources and Community Development-Office of Coastal Management	18-20
Washington County Board of Commissioners	21-29
First Colony Farms (Campbell)	30-33
First Colony Farms (Barnes)	34-48

11.2.1 RESPONSE TO COMMENTS 1-5. In the early 1780's, a group of Halifax and Edenton men intended to drain Lake Phelps and farm the fertile bottom. The General Assembly, in 1784, enacted a bill authorizing these men to proceed and allowed them a period of seven years, during which time the land was to be exempt from taxes. However, at the same time, several members of the lake draining group were eliminated, and Josiah Collins was added. Collins saw the adjacent swampland as future fertile rice fields, for which his desires became fact in the reign of the Lake Company. Thus, the canals were used to drain the adajacent farmland, and to allow periodic fresh water flooding (irrigation) from the lake.

The last paragraph on page 17 of the Task Force Report (Book Two) has been changed to read: N. C. General Statute 143-355 requires the N. C. Department of Natural Resources and Community Development to plan, excavate, and administer programs for the preservation, development, and improvement of rivers, harbors, and inland ports, and for dune rebuilding, hurricane protection, and shore-erosion prevention, such programs to include accomplishment of approved civil works projects.

The first paragraph on page 18 of the Task Force Report (Book Two) has been changed to read: State funding for such projects is in the discretion of the Secretary of the Department of Natural Resources and Community Development. His authority is derived from appropriations bills allocating money for such purposes to the NRCD. Any project eligible for construction under an existing Federal program cannot be constructed under the State program.

The last sentence of the second paragraph on page 7 has been deleted as suggested.

The word erosine in the fifth paragraph on page 38 is correct.

11.2.2 RESPONSE TO COMMENTS 6-17. The Lake Phelps Lake Management Study is based on the Principles Governing the Establishment, Extension, and Development of the State Park System of the State of North Carolina. These principles state: the purpose of the North Carolina State Park System shall be: to serve the people of North Carolina and their visitors by:

1. Preserving and protecting natural areas of unique or exceptional scenic value not only for the inspiration and benefit of the present generation, but, also for generations to come.

2. Establishing and operating State Parks that provide recreational use of natural resources and outdoor recreation in natural surroundings.

3. Portraying and interpreting plant and animal life, geology, and all other natural resources and outdoor recreation in the various state parks.

4. Preserving, protecting, and portraying scientific sites of statewide importance.

Comparison of the principles and the purportedly "inadequately addressed" State policy concerns included with this comment will illustrate a strong resemblance.

Due to the similarity of the objectives of this management plan and those of AEC nominations, there will be no significant adverse impacts upon any potential Lake Phelps AEC nomination resulting from implementation of this management plan.

11.2.3 RESPONSE TO COMMENTS 9-16. Local agricultural activities, both small farms and "super-farms" have received special consideration in the management plan. The interests of both size agricultural operations have been treated equally, and in no instance did "super-farms" receive special attention. The Division of Parks and Recreation has no land use regulatory authority beyond the boundaries of any given State Park or State Lake. The lake level computer modeling conducted by Hai Tang (NRCD - Division of Environmental Management) utilizes several independent variables, of which ground water outflow from the lake is one. Day by day lake level management operating procedures, which will use this computer modeling and existing data, will allow for variation in groundwater outflow quantities. Future agricultural pumping or drainage activities in the immediate Lake Phelps region may increase the quantity of groundwater outflow from the Lake, however, the management plan will adjust for this change as it would for any other variable change (such as decreased rainfall, etc.) Realistic lake management is thus assured.

The data contained on pages 12-18, 23, 25-28, 31 and 38-41 adequately addresses the comment concerning historical drainage systems, flood levels, etc.

To reiterate the comment: "This plan does not adequately address a primary local concern over septic tanks along the lake's rim. The establishment of a "range" does not further the long stated local objective of having "one" level established from which they might realistically measure in regulating the proximity of septic tanks, nitrification fields, and wells to the "states" lake." Reviewing elementary hydrology, there are many factors affecting the level of Lake Phelps water in any given day. Variable quantities of precipitation, evaporation, groundwater seepage, groundwater recharge, rim leakage, and gate leakage affect the lake level on an hourly basis. It would be assumptive to base planning decisions on "one" lake level due to this extreme variability. The Lake Phelps Lake Management Study, which is completely separate from the problems of a Lake Phelps State Lake property boundary line, accurately predicts the range of lake levels that would result from management plan implementation. If one were to take the mean of the daily modeled lake levels over a 22½ year period, 11.29'msl could be considered the straight mean lake level (not to be confused with the frequency weighted optative mean lake level of 11.26' msl). However, the frequency of accomplishment of this level is 1.6% of the time. Surely, basing a planning decision on a probability of an event occurring 1.6 times in 100 opportunities would certainly cause the failure of that plan. The issue of septic tank and nitrification field regulation on the lake rim is extremely important. However, any septic system below approximately 12.2'msl (point of natural overflow from the lake) stands a chance of malfunction from flooding or high ground water tables.

It is the opinion of the N. C. Department of Natural Resources and Community Development that the Final Lake Phelps Lake Management Study more than adequately addresses the two claimed land use benefits of:

"* net decrease in flood amount, duration, and frequency (both farmland flooding from canal overflow, and rim property lake overflow.)"

"* decrease in the probability of rim septic-tank-septic tank nitrification field malfunction, and thus, less chance of ground water and lake water pollution."

Since initial Lake Phelps planning activities in June, 1975, "those local boards dealing with planning questions" have been afforded every opportunity to contribute to these planning activities. Additionally, page 34 states:

> "Furthermore, the management plan is not an irreversible action. Based on the scientific analysis requirements inherent in the management plan (i.e.: continued lake level monitoring, correlation analysis, inspection of land flooding etc.) if future analysis indicates that the management plan is not totally successful in meeting its objectives, it can be readily modified."

The Washington County Board of Commissioners has nominated an area in the Lake Phelps region as an Area of Environmental Concern under the North Carolina Coastal Area Management Act. Furthermore, Lake Phelps, an AEC under the Public Trust Water category is governed by the CAMA Management Objective of: "To protect public rights for navigation and recreation and to preserve and manage the public trust areas so as to safeguard and perpetuate their biological, economic and aesthetic value." This objective is identical to several components of the Lake Phelps management study objective. The management objectives for Coastal Complex Natural Areas (the AEC category sought by the Board of Commissioners for the Lake Phelps region) closely parallel the objective of lake level management. It is the opinion of the preparers of this document that the Lake Phelps Lake Management Study will have no significant adverse affects on this potential AEC nomination.

Comment number 15 is an reiteration of previous comments, thus further discussion is not warranted at this point.

The Division can not respond to comment number 16 without an indication of what adverse effects upon which specific program activities.

11.2.4 RESPONSE TO COMMENT 17. The Division of Parks and Recreation is proceeding with Lake Phelps Lake Management Study adoption and implementation processes.

11.2.5 RESPONSE TO COMMENTS 18-20. As a portion of the N. C. Wood Utilization Program, preliminary planning has begun with regard to coastal fiber fueled electric power plants. A portion of this fiber will be derived from the harvesting of deep peat in the coastal plain. First Colony Farms holds three major peat fields, one of interest is the Phelps Field located adjacent to, south and east of the Lake. The proposed deep (72 inches) harvesting from this 60,627 acre field will result in several significant adverse environmental impacts. In order to harvest this peat, the water table will be lowered up to 6 feet in the Phelps region, accomplished via new drainage canals and pumping. To maintain the harvesting of these fields, plus to assure the long-term productivity of future agriculture on these fields, such plans subject the area to the eternal demands of drainage and pumping. The lowering of the water table to below the bottom level of the lake could result in a massive groundwater outflow from the lake, thus permanently damaging the unique vegetation, wildlife, cultural, and recreational environs of the lake.

The 1976 CAMA Washington County Land Use Plan has classified the northeast rim of Lake Phelps as conservation (fragile, hazard and other lands necessary to maintain a healthy natural environment and necessary to provide for the public health, or welfare); a portion of the east rim as rural (lands whose highest use is for agriculture, forestry, mining, water supply, etc. based on their natural resources potential, also, lands for future needs not currently recognized); and the remainder of the rim is classified as community (lands where low density development is grouped in existing settlements or will occur in such settlements during the following ten year period and which will not require extensive public services now or in the future).

The Washington County planner is aware of the fact that the Division of Parks and Recreation has contracted for the establishment of a reference line survey around Lake Phelps. When the results of this survey are received by the Division, they will be made available to the Washington County Board of Commissioners and any other interested parties.

11.2.6 RESPONSE TO COMMENTS 21-29. Lake Phelps has a high water mark at approximately 12.1'msl, where natural overflow occurs (this fact is mentioned numerous times in this document). Also stated in the document is the fact that the Division is currently in the process of having a N.C. State Lakes regulatory limit line established around the lake. When this survey is completed, the information will be released to the public. Property was sold to individuals when the lake level was at approximately 8'msl, although the State boundary is the natural high water mark. The matter is being handled by the Attorney General's Office.

No single impact considered by the management plan will be completely resolved. Page 26 states: "Detailed analysis of the resource analysis sections, and the preceeding alternatives has led to the development of a compromise management alternative that would decrease the maximum attainable benefit per any study component (i.e. wildlife, flood protection, etc.), while at the same time significantly decreasing the magnitude of the maximum resulting adverse environmental impacts on these components." As is also contained in this document the comment on aeolian sediments is an adequate assessment of the situation.

Due to unpredictable hurricanes and heavy rains, there will be a corresponding unpredictable rise in water level. All lakes have a mean high water mark. The Division of Parks and Recreation has no sanitation or health authority to assure that sewage disposal systems will be located at a safe distance from the water (through county health department permitting processes or any other means).

The material contained in comment number 24 is an accurate assessment of the situation.

In a memorandum dated May 11, 1979 from NRCD Assistant Secretary Grigg to NRCD Deputy Secretary Jones, and further stated on page 40: "It is anticipated that large sums of money would have to be expended in order to study, review, and calculate precisely the potential monetary flood damages on the properties around the lake. A study of such magnitude at this time is not recommended because most of the structures at the south shore of the lake would not be flooded except under extreme events."

The N. C. Department of Natural Resources and Community Development supports this management study as an appropriate plan of action. Plan effects on vegetation have been more than adequately assessed; nothing can be done about sketchy past lake level data; other resource components other than recreation will be economically impacted; the 40 years of controversy at Lake Phelps indicate that the problems will never be totally resolved. The high water mark at Lake Phelps is at approximately 12.2'msl; and the expense of the project is justified.

The Division of Parks and Recreation has no land regulatory authority (structure, sewage disposal system placement) outside the boundaries of a state park or a state lake.

The typographical errors have been corrected.

The NRCD Office of Coastal Management has reviewed and commented on the project.

11.2.7 RESPONSE TO COMMENTS 30-33. The Lake Phelps Lake Management Study strives to protect riparian owners while at the same time protecting and preserving the lake's natural resources. One of the major objectives of the plan is to manage the Lake Level fluctuation so as to provide an adequate margin of safety (storage capacity) and to prevent overflow in the event of the extraordinary or tropical storm. During the fourth hydro-management period (from mid-July to late October), the State will release water from the lake in order to maintain the lake level fluctuation between 10.47' msl and 11.71' msl. Therefore, during the hurricane season, the lake would have an approximate storage capacity of 1.63'. However, in uncontrollable, extreme situations, the lake will exceed 12.0' msl. The probability of this occurrence is 5 times in 22 years, for an average duration of nine days per occurrence. In light of the other management objectives, the N.C. Department of Natural Resources and Community Development is of the opinion that lake management during this fourth hydro-management period will provide an adequate safety margin.

The N.C. Department of Natural Resources and Community Development has, and always will recognize the myriad opinions and impressions dealing with Lake Phelps. For it was these opinions which impressed upon the State that the concern to recognize the rights of Lake Phelps riparian owners was of equal importance as protection of the lake's natural environment. This study, which was initiated in January, 1979 was assigned to personnel of the Division of Parks and Recreation who had not attended the 1978 public meetings. Therefore, while the private concerns formed a foundation for the study, previous State management proposals for Lake Phelps played a small if any role in the initial study philosophy.

Utilizing the resource data contained in the earlier Task Force Report, Parks and Recreation staff then collected specific additional data on Lake Phelps from many agencies and individuals. From this data base, the foundation philosophy of environmental analysis was utilized. Several management alternatives were formulated (presented on pages 23 to 28 of this document) and subjected to environmental impact analysis. The resultant proposed action management plan is a compilation of these alternatives. The net result is a flexible plan of action that produces the highest possible quantity of benefits per the lowest possible cost. The proposed action thus is a result of intense study, and in no way can it be construed that the study was written and slanted to justify the proposed action.

As was promised at earlier public meetings, the public was provided the opportunity to comment on the Lake Phelps Lake Management Study at a public meeting held in Creswell, NC on January 17, 1980.

The statement on page 12 of the Task Force Report dealing with the relationship of irrigation to the location of the groundwater table was intended as a generalized hydrologic statement. It's location between two paragraphs referring to First Colony Farms caused an unintentional reference. The clarification paragraph following the paragraph under question has been changed to read: "Farming operations of this magnitude, if ever implemented adjacent to Lake Phelps, would affect the wildlife habitat, fishery, waterfowl habitat, as well as the recreational potential of the lake and park".

Upon implementation of the Lake Phelps Lake Management Study, the State of North Carolina will manage the lake in predominantly it's historical fluctuation pattern. The major deviation from the historical will be the deliberate flattening of the fluctuation peaks, so as to avoid unnecessary flooding and drought conditions. As has been stated numerous times, flooding of riparian owners was a situation that gave rise to this study, was deliberately given a high priority in the study, and will be a foremost concern during activation of the plan. The mean high water mark has, and always will be at approximately 12.2' msl (the point of natural overflow from the lake). However, due to the presence of private property below this line, State Lakes Regulations will be enforced at some point below the natural high water mark. This enforcement will take place at the managed mean high water level of 11.50' msl. During extreme conditions, the State may flood adjoining property for which this document has fully addressed the propriety and effect of such action.

The artificial level complained of is an artificial low level. The release of water through the canals has the effect of preventing the lake from reaching its normal high water level.

11.2.8 RESPONSE TO COMMENTS 34-48. When it becomes necessary to release water from the lake in order to maintain the water level within the proper hydro-management period range, the gates will be opened when the canals can handle the extra water without flooding the adjacent farmland. In extreme conditions when the potential exists for flooding either rim land owners or down canal farm land owners, gate opening decisions will be jointly made The Lake Phelps Advisory Committee, the Superintendant of Pettigrew State Park, and the Division of Parks and Recreation Raleigh Office.

There may be times during excessive farm land draining and northeast wind canal water backup, that adjacent farmland property may flood. However, this situation will not always be related to water release from the lake.

The cane climax sentence on page 5 of the Task Force Report has been changed to read "If there is frequent fire damage and the water table is lowered either by reduced precipitation or increased drainage, the vegetation remains in cane."

Section 2.2 External Influences and Encroachment of The Task Force Report is intended as an overview of the adverse land uses that have, and may affect the integrity of the Lake Phelps natural resource base. In the past decade, land use planners have come to realize the controversial nature of the subject, and to this day, any given land use analysis is encompassed by many varied and often opposing opinions. With regards to Lake Phelps, not only do several reports document the current status of the Lake Phelps land use status (i.e. Heath, 1975; Hazard, 1978 etc.), but study of aerial photography firmly documents this situation.

The Division recognizes the fact the residential development along the shore is attributable to people from all walks of life for recreation exposure. We reiterate the statement on page 12, paragraph 7, line 2: of The Task Force Report "Farming interests are partially..."

The positive influences related to a 10-15 inch drop in the water table are attributed almost solely to the creation and maintenance of agriculture in a lowland swamp environment.

It is not the intent of this document to address the logistics and rationale of Pettigrew State Park Development. The Pettigrew State Park Master Plan and Final Environmental Impact Statement fully assess the swimming situation.

The Pettigrew State Park master plan calls for the acquisition of 212 acres of vegetation on the north and northeast shore to provide the land base for Pettigrew State Park future recreation development. In the present fiscal and political environment, it is not feasible for the Division of Parks and Recreation to consider other rim vegetated land acquisition.

The Division agrees that the soils would not be highly organic without an excessive water table. This is a natural condition.

Groundwater seepage into the lake has probably always occurred, presently in a far less amount than before the canals were developed. Although the land surface may slope away from the lake, it is not necessarily true that the groundwater table is parallel to the land surface. Whereas the depth of water in the canals and the depth to the water table are admittedly different, the overall groundwater table is considerably lower than pre-canal conditions.

The statement concerning requests for water release was made in reference to requests for irrigation and fire control water.

The entire Lake Phelps Lake Management Study document addresses the many demands placed on the lake's water. These demands include water release for the herring run, demands for the maintenance of low lake levels to prevent flooding, demands for the maintenance of high lake levels to protect vegetation, wildlife, and recreation interests etc.

Whereas extensive wind data exists, space restrictions prevented it's inclusion in this document. Furthermore, where past extreme events have occurred (with relation to a given velocity from a given direction in a given month) it is virtually impossible to model from these extreme, unexpected events.

Many sources document the rationale behind the statement of "the high phosphate content of the sediment indicates that the external source of the sediment consists of air dried and wind transported organic soils that border the lake", (Heath, 1975; Hazard, 1979, Allen et al, 1979 etc.).

The figures referred to in comment number 47 came directly from Heath, 1975.

The illustration on page A.13 of the appendix was taken from Heath, 1975, and represents the only graphic illustration of groundwater locations for this area of the coastal plain.

11.2.9 RESPONSE TO ADDITIONAL COMMENTS. At a recent meeting with the NRCD Washington Field Office, The Division of Parks and Recreation received the following comment:

"The statement on page 24 concerning the spawning period for the blueback herring and alewife is incorrect." Although the management plan does not especially note the fact that the spawning period runs from mid-February to mid-May, the fact played an important role in the management plan considerations. Due to recent information concerning the low flow required (minimum of 2 cfs), the management plan spring release season will be extended to mid-May without affecting the overall plan.

11.3 COMMENTS TO THE DRAFT DOCUMENT. The comments received by the Division of Parks and Recreation, and responded to in the previous section can be found on the following pages. The comment number is located in the left margin.

State of North Carolina
Department of Justice
P. O. Box 629
Raleigh
27602

RUFUS L. EDMISTEN
ATTORNEY GENERAL

AUG 1
DIV. OF PARKS & [illegible] TION

13 August 1979

MEMO

TO: Tom Wells

FROM: W. A. Raney, Jr., Special Deputy Attorney General

RE: Lake Phelps Management Plan/EIS

I have very few short comments on the Lake Phelps Lake Management Study. References are to page number.

1 Page 3. In the third paragraph the statement concerning the original purpose of the canals is questionable. As I understand the history of the Lake, the canals were originally dug in an attempt to drain the Lake. It was after that attempt was abandoned that they came to be used primarily for farm drainage below the Lake. (See 4.4 p 17).

2 Page 17. The statutory references and analysis on the bottom of page 17 is not entirely correct. While the EMC is given certain duties with respect to civil works projects, the clearest statement of plaining responsibility is found in G.S. 143-355 which gives plaining functions to the Department of Natural Resources and Community Development. The authority in Article 21 does not seem to me to be pertinent to the subject matter being discussed. I suggest changing EMC to DNRCD and changing the cite to G.S. 143-355. (The word excavate should be execute.)

3 Page 18. G.S. 143-215.3 does not give EMC the authority stated in the first paragraph. The regulations purportedly adopted by the EMC are not authorized by any statutory authority of the EMC. State funding for such projects is in the discretion of the Secretary of NRCD and his authority is derived from appropriations bills allocating money for such purposes to the DNRCD. The last sentence of that paragraph may be State policy but it is not required by law.

4 Page 48. At the end of the first paragraph reference is made to the legal authority for drainage projects. I suggest deleting the last sentence since there is no such statute as G.S. 143-215.3. Apparently the intent was to cite G.S. 143-215.3, however no such legal authority if found in that section.

5 Page 58. In the fifth paragraph should the word "erosine" be "erosive"?

/ck

MEMO TO: Milan Muzinich, Manager
Washington Regional Office

FROM: Steve Benton
Coastal Management Consultant

DATE: 11 September 1979

SUBJECT: Reviewing "Applications for Federal
Assistance and Environmental Impact
Statements"

PLACE: Lake Phelps-Washington, Tyrrell Counties

IDENTIFICATION: #202-79

COMMENTS: See Below

1. The document has not been adequately reviewed because of an insufficient review period.

6 2. State policy concerns listed below have not been adequately addressed in the plan. (Policy concerns are from the State of North Carolina Coastal Management Program Plan).

7 3. There is no coordination apparent in the Task Force Report, Management Plan or Environmental Impact Statement with the Washington County Complex Natural Area of Environmental Concern designation process.

8 4. A number of unsubstantiated technical statements are used in the decision making process which, based on my research experience in the region and educational background, I do not believe to be accurate.

CONTINUED

Recreational and Tourism Resource Policies

Recreation

It is State policy:

(1) To protect and preserve its land and waters for the benefit of all its citizenry by acquiring and preserving park, recreational and scenic areas. As set forth in Section 5, Article 14 of the Constitution of North Carolina and implemented under all authorities mentioned below.

(2) To preserve to the greatest extent feasible, the public's opportunity to enjoy the physical, esthetic, cultural, and recreational quality of the natural shorelines of the State. As set forth in and implemented under the CAMA.

(3) To maintain superior quality of water and air resources to ensure continued enjoyment of the natural attractions of the coast. As set forth in G.S. 143-211 and implemented under authority of G.S. 143-214.1 and G.S. 143-215.1.

Growth Management Policies

It is State policy:

(1) That land resources in the coastal zone shall be managed in order to guide growth and development and to minimize damage to the natural environment. Development or preservation of coastal resources shall proceed in a manner consistent with the capability of the land, air and water for development, use, or preservation based on ecological considerations. As set forth and implemented under authority of the CAMA.

MEMORANDUM

TO: Milan Muzinich

FROM: William Keith Painter
Division of Community Assistance

RE: Lake Phelps Lake Management Study

DATE: September 11, 1979

The preface of this document mentions that: a) this management plan is the result of a "multi-disciplinary inter-agency" study conducted within "extremely restrictive time and personnel allocations." Such a restrictive time allocation is evidenced by the fact that the planning section of this office had two (2) hours to prepare any comments, and request for extension was denied.

Aside from the questionable procedure followed in allowing comment on this project, I have the following comments:

9 1) Questions concerning the effect of the proposed management plan upon local agricultural activities, other than those addressing 'super-farms', are given little attention. This plan does not adequately address projections of future agricultural pumping or drainage activities and the net effect those activities may have upon local and regional water tables - and thus upon realistic lake management.

10 2) The effect of this management plan, or its lack of effect, upon the areas delineated by the United States Department of Housing and Urban Development Flood Hazard Boundary Maps for Washington and Tyrrell counties, and the towns of Creswell, Cherry and Columbia is not dealt with by this plan. Any changes in historical drainage systems in this area could significantly affect the Flood Insurance Programs in these communities. It is significant to mention that federal monies have or will be spent in these areas for improved housing; these housing activities must respond to a realistic predicted flood levels.

11 3) This plan does not adequately address a primary local concern over septic tanks along the lake's rim. The establishment of a "range" does not further the long stated local objective of having "one" level established from which they might realistically measure in regulating the proximity of septic tanks, nitrification fields, and wells to the "state's" lake.

4) In consideration of comments 2 and 3, this plan does not adequately document two claimed land use benefits -

"* net decrease in flood amount, duration, and frequency (both farmland flooding from canal overflow, and rim property lake overflow.)" **12**

"* decrease in the probability of rim septic tank-septic tank nitrification field malfunction, and thus, less chance of ground water and lake water pollution."

5) The direct impact of this plan upon local land use should necessitate review by those local boards dealing with "planning" questions - such review was not adequately provided such local boards - so impacts upon local land use policies cannot be accurately determined. **13**

6) This plan makes no mention of the current efforts of Washington County to have the Lake Phelps area nominated as an Area of Environmental Concern under the North Carolina Coastal Area Management Act. Such an omission neglects the consideration of possible important changes in the objectives of lake level management. **14**

7) This plan's implications for conflict with, or at least impact upon, local and federal projects, plans or policies including but not limited to - flood insurance, subdivision regulations (wells, septic tanks, lot size and configuration), and DHUD Community Development Projects in both Washington and Tyrrell counties are not adequately treated. **15**

16 This plan, for the reasons stated above, has grave problems in treating several topics of significant local impact. Thus, I anticipate both adverse effects and conflict with specific program activities.

In addition to these comments, I reserve the opportunity to submit additional comments by phone on September 12 - as per today's phone conversations with the Environmental Assessment Office.

State of North Carolina
Wildlife Resources Commission
RALEIGH, N. C. 27611

LIAM C. BOYD, *Kernersville*
IE C. BRIDGES, *Greensboro*
LACE E. CASE, *Hendersonville*
IE O. CLONINGER, JR., *Dallas*
A. HUNEYCUTT, *Locust*
RY E. MOORE, JR., *Clinton*

J. ROBERT GORDON, *Laurinburg*
Chairman

ROBERT B. HAZEL, *Raleigh*
Executive Director

LEE L. POWERS, *Lake Lure*
M. WOODROW PRICE, *Gloucester*
EDWARD RENFROW, *Smithfield*
DEWEY W. WELLS, *Camden*
W. STANFORD WHITE, *Manns Harbo*
V. E. WILSON, III, *Rocky Mount*

September 18, 1979

MEMO TO: Anne Taylor

FROM: Frank B. Barick

SUBJECT: Lake Phelps Management Plan

17 Subsequent to your recent memo we have reviewed said plan and find that it adequately provides for conservation of endemic fish and wildlife resources. We therefore recommend its adoption and implementation.

FBB/dlp

Enclosure

MEMO

TO: RICHARD HAZARD

FROM: DANIEL SMALL

THRU: DAVE OWENS

SUBJECT: LAKE PHELPS MANAGEMENT PLAN/DEIS

DATE: September 18, 1979

I have reviewed the management plan/DEIS on Lake Phelps and have several comments that you might want to consider. I have talked to Steve Benton about them and it is my understanding that he will be including them in his review.

18 First, on page 5 of the study, there is a brief discussion on mining in the county but no mention is made of the proposed peat mining operation by First Colony Farms.

19 Second, there is no discussion of Lake Phelps being an AEC under CAMA, nor is there a discussion of the Washington County Land Use Plan.

20 Third, if the area around Lake Phelps becomes an AEC, a more definitive boundary of the lake level will be needed. It is my understanding that this survey work is presently being done. If this is the case, the county should be informed since the nomination will be coming from them and they will need the information in order to delineate the area being proposed.

DS/aw

Albemarle Regional Planning and Development Commission

OFFICE: PHONE 426-[illegible]
CHURCH STREET
BOX 646
ORD, N. C. 27944

Region "R" Clearinghouse
Lead Regional Organization
ROBERT J. WHITLEY, EXECUTIVE DIRECTOR

[illegible]
P. O. BOX 42[illegible]
[illegible] N. C. 27[illegible]

September 7, 1979

Ms. Chrys Baggett
State Clearinghouse
N.C. Division of Budget and Management
116 W. Jones Street
Raleigh, N.C. 27603

Re: SCH #202-79--Lake Phelps Lake Management Study

Dear Chrys:

The attached comments from the Washington County Board of Commissioners were received today by our office concerning the above-mentioned study. Please include these comments [illegible] by the Region R Clearinghouse to the State Clearinghouse [illegible] final comment is made by the state.

Thank you very much.

Sincerely,

Pam Whitley
Clearinghouse Coordinator

PW:lrf

Washington County Board of Commissioners

MEMORANDUM

DATE: September 5, 1979

TO: Bill Hartman

FROM: Wendy Painter Wendy

RE: Lake Phelps Lake Management Study

My assessment of the Lake Phelps Lake Management Study has suggested important areas which justify the concern and the attention of Washington County Officials.

It is my understanding that the Lake Phelps lake level study was initiated primarily due to problems with the flooding of farmland down stream of the Lake, the erosion of property on the south side of the Lake, and property damage (ie. structures, septic tanks and drainage fields) caused by high water.

Initially the designation of a minimum optimum lake level was considered the most feasible solution to the problem. During my research in early spring, discussions with state officials revealed more than one suggested mean high water mark, one requested by property owners and another suggested by engineering data and lake level records.

The management study under review does not designate a mean high water mark. This lack of decisiveness has created two specific problems for the County.
21 A definitive line for use in determining an adequate setback for septic tanks and drainage fields is still nonexistent. Local health officials have expressed the immediacy of the "public health problem" caused by inundation of septic tanks as early as 1974. A designated property line for tax purposes is not available. Although the State owns property below the mean high water mark, property was sold to individuals along Lake Phelps with the low water mark as the property boundary.

Now the State of North Carolina will "attempt to manipulate" the lake level fluctuation so that they remain in the following ranges:

Period	1	10.63' - 11.52' msl
	2	11.08' - 11.76' msl
	3	10.73' - 11.67' msl
	4	10.47' - 11.71' msl

There is, according to the study, a slight chance the lake will exceed these average ranges. The actual possible extreme fluctuation range per hydro-period will be:

Period	1	10.51' - 11.87' msl
	2	10.96' - 12.07' msl
	3	10.56' - 12.09' msl
	4	10.41' - 12.10' msl

Although the Division of Parks and Recreation plans to maintain a 11.5' msl lake level the level will sometimes drop below 10.5' msl and rise above 12' msl.

2 This brings me to specific comments concerning the evaluation of no action - no lake level management on page 39. Of the five listed impacts only one will be resolved by lake level management, the impact on recreational facilities. If the lake level is left to its on device, or if the level is managed, wind blown or aeolian sediments will continue to exist due the massive agricultural development adjacent to Lake Phelps. The process of eutrophication considered detrimental to the future of Lake Phelps, could easily take place with or without management tools. Sediment will continue to be deposited and nutrients from existing and newly installed septic tanks and lines will reach the Lake water when the water level "occassionally" rises above 11.5' msl.

23 Due to the unpredictable rise in water level and the lack of a mean high water mark, there is no assurance sewage disposal systems will be located at a safe distance from the water, even with lake level management.

24 Despite management, adjacent farm land will be subject to flooding at times due to intense northeastern winds and due to "extremes" as mentioned on page 42, forcing a decision as to who gets flooded; rim property owners or downstream property owners.

25 In reference to cost of maintenance and management on page 39 I would be interested in knowing how the cost of no action will compare with the expense of the proposed management plan. I do not feel the impacts of the lake level management plan have been adequately assessed in terms of dollars.

The cost, referred to on page 56 as a "modest investment", to tax payers is primarily for the benefit of property owners adjacent to Lake Phelps. Not only will the actual implementation of the study be costly, in my opinion, but it will also increase the cost of the execution of the Pettigrew Park Master Plan.

To present a more thorough assessment of the benefits of a project which admittedly will not totally resolve present problems, it appears projected financial data should be included in the project documentation.

inability to assess the effect on vegetation if the plan is implemented, sketchy past lake level data, increased cost and expanded dredging required for Park Master Plan implementation, inability to totally resolve problems
26 associated with Lake Phelps, the lack of a designated mean high water mark and the undetermined expense of the project which will be borne by the tax payer leave questions in my mind as to the appropriateness of the suggested plan of action.

The management or alteration of a natural system to protect certain individuals is not an acceptable solution. As noted in the Study text repeatedly, one cannot predict the actions of natural elements. It is my opinion that the development of an elaborate plan of action is not the only alternative.

Designation of a mean high water mark and the removal and relocation of septic tanks which are threatened by the lake level appears to be an alternative which should be seriously considered. Future structures and
27 sewage disposal system would have to be located farther from the natural system which has always and will continue to be in flux. Man's constraints cannot prevent changes in the natural environment, but many times will perpetuate increased damage.

Typographical errors noted are:

p. 31 1st paragraph 4th line indicates that when
p. 47 No. 3 Action Step 1 and 2-last paragraph 3rd line Division of Parks and
28 p. 48 2. Record keeping the the action
p. 49 1st pargraph 12th line less than 12.2"
p. 51 2nd paragraph 2nd line not onTy per
p. 56 2nd paragraph 3rd line endangered species habitat
p. A62 1st paragraph last line that render

One last question which I feel is warranted; Has the Office of Coastal Management or the Coastal Resources Commission reviewed the study, which
29 deals with an Area of Environmental concern, the Public Trust Waters of Lake Phelps?

:pdp

First Colony Farms, Inc.

Route 1, Box 201
Creswell, North Carolina 27928
Telephone 919 797-4371

August 24, 1979

Hon. Howard N. Lee, Secretary
N.C. Dept. of Natural Resources
and Community Development
Box 27687
Raleigh, NC 27611

Dear Secretary Lee:

The management of First Colony Farms, Inc. has had an opportunity to review the recently forthcoming "Lake Phelps Lake Management Study" and we wish to offer the following comments:

1. The study gives minimal lip service to the overwhelming
consensus voiced at the "public hearings" held late last summer in
Creswell, NC. The study indicates that diverse interests and concerns
were voiced at these hearings. It is our collective recollection that,
30 although diverse interests were represented, the concerns and demands
all addressed one issue, and that these interests were unanimous as to
how the issue should be resolved.

The issue was, of course, flooding and potential flood dangers posed by Lake Phelps. The solution appeared to be maintenance of a Lake level which would protect riparian owners and would provide a buffer capacity which would prevent overflow in the event of the extraordinary or tropical storm. The proposed plan does not provide this margin of safety.

2. Subsequent to the "public hearings" First Colony Farms and
other area landowners continued to press for action and relief. We
were assured that a great deal of effort was being put forth by the
State to prepare a management plan which would recognize and deal with
our interests, and that once such a plan had been formulated it would
be circulated to us and further "public hearings" would be held in
31 order that our comments on the plan could be received and evaluated.
It now appears that the plan or "Study" is the final product and no
such hearings will be conducted.

3. The document contains many inconsistencies and much error, ranging from the trivial to apparently premeditated misinformation. As an example, on page 12, it is stated that "A condition of ground

water variation is present when farms and other interests pump significant
quantities of water from wells to irrigate the fields . . . hydrologists
...are certain that a drawdown of the water table occurs during the dry
season when farms are irrigating crops." Irrigation of crops is not
practiced in the Lake Phelps area to any significant extent and we know of
no instance in this area where wells provide an irrigation source. However,
it is not the purpose of this letter to quarrel with the details of
32 the Study, it is simply our distinct impression that the proposed action
is not a result of any study, but that the Study was written and slanted
to justify the proposed action. We will be happy to point out other
errors if requested.

4. It appears that the State has decided to maintain an artificial
Lake level without regard to whether this action results in flooding
riparian owners. On page 28 it is stated that the mean high water mark
(and therefore the property line according to State Lakes Regulations)
has not been "established." Therefore it is distinctly possible that the
33 State is flooding adjoining property by maintaining the proposed levels,
and the Study does not address the propriety, legality, or effect of such
action.

We consider this to be absolutely irresponsible.

Furthermore, we do not concede that the property line is the "mean high water mark" in any case. North Carolina cases have held that, with respect to inland waters, the property line is the "low water mark," and previous "State Lakes Regulations" have likewise so stated. In any event, we do not believe that we can be granted or deprived of real property by the promulgation of regulations by a department of the State which define the extent of our property.

We are disappointed in the Study and the proposed action, and particularly in the apparent willingness of the State to absolutely disregard our property rights. We hope that you will see fit to reconsider the proposed action and to provide the citizens of this area with an opportunity to effectively voice their concerns.

Very truly yours,

FIRST COLONY FARMS, INC.

R. N. Campbell, Jr.
Vice President

RNC:hr

cc: Gov. James B. Hunt, Jr.
Sen. Melvin R. Daniels, Jr.
Sen. Joseph J. Harrington
Rep. Vernon G. James
Rep. Charles Evans

COMMENTS ON THE MANAGEMENT PLAN

-written directly in the document, and abstracted here.

Steve Barnes - First Colony Farms

34 1. Page one of Summary - In reference to the sentence "The State will strive to maintain the lake level within a fluctuation range of 10.73' above msl to 11.67' msl." When are the gates opened?

35 2. Page two of Summary - In reference to 3b. Adverse Environmental Impacts - Why will there be the slight probability of short-term lake rim flooding from high lake levels and adjacent farmland flooding from high water levels in the canals if the gates are closed when the canals are high?

36 3. Page five - The last paragraph is inaccurate with regard to the cane climax situation.

37 4. Page 12 - The first paragraph in 2.2. External Influences and Encroachment is strictly inflamitory (SIC), and technically can not be backed up. In reference to the second paragraph, "what farm irrigation?" there is less here than before. The 10-15" change in water table (annual) for areas developed for agriculture actually have many positive influences as well. In reference to the fourth paragraph - most lots belong to people of all walks of life for recreation exposure, what is the point of insinuation here? This whole 2.2 section should be reconsidered. It represents a negative bias and from there goes down technically and otherwise.

38 5. Page 13 - Swimming is not so practical along north shore due to muddy shoreline and bottom along shoreline.

39 6. Page 14 - Add a category 10) - State purchase of natural vegetation areas around lake most desired to leave that way ex. cypress areas on NE and N sectors.

40 7. Page 15 - Under 4.2 Sediment Characteristics - "This characteristic has been noted as a limitation of highly organic and mucky materials if the water table in these soils has been excessive." wouldn't have high organic soil if water table wasn't excessive.

41 8. Page 16 - In reference to the last sentence of the first paragraph - was the latter occuring (SIC) to begin with and at what areas since a lot of areas the natural topography slopes away from lake.

42 9. Page 16 - In reference to the fifth paragraph, - groundwater that would normally flow toward the lake is not intercepted by a vast network of canals that cross the drainage divide. In reference to the last paragraph - this situation does not happen as indicated; the depth of water in canals and water table differ greatly.

43 10. Page 20 - With regard to the third paragraph - what requests except for fire and then only once or twice?

44 11. Page 21 - "This policy has basically remained in effect up to 1977, however, with the increased demands in the lake for water . . ." - What demands?

45 12. Page 26 - In reference to table 1. - Wind interest with regards to incidence of wind by direction by month at velocity above 5, 10, etc. There is a lot of hard wind out of north (NE, N, NW).

46 13. Page 28 - Third paragraph - second sentence - There is no way this statement can be made, it is totally invalid.

47 14. Page 30 - In reference to the last paragraph, next to last sentence - where did these figures come from? They are lower than extensive data reveals.

48 15. Page A.13 - this illustration is invalid.

[illegible] subscribed before me this 18th
[illegible] October, 1979
[illegible] my hand and official seal.
Ruby Kroeker Notary Public

My Commission Expires March 15, 1984

SIERRA CLUB - CYPRESS GROUP
GREENVILLE, N.C. 27834

RECEIVED
FEB 12 19
STATE PARKS
& RECREATION

Jim Stevens

N.C. Division of State Parks

Raleigh, N.C.

Statement concerning the public meeting held in Creswell, NC on 17 January 1980.

Representatives of the N.C. Department of Natural Resources and Community Development presented a draft of their proposed water level management plan for the state owned Lake Phelps. This plan is opposed by the lakeside homeowners who believe that it sets too high a mean level and poses a threat to shoreline stability and their own property rights. Other residents of the area (farmers, commercial fishermen, sports enthusiasts, long-term residents, and others) seem to support the plan or at least are not vocally opposed to it.

The draft plan seems to have been carefully worked out so as to provide a regime or control strategy designed to approximate the natural annual variation in lake level while simultaneously providing for anadromous fish migration in the spring, boating access, and flood storage capacity during the hurricane season.

A deveolping issue is the request by county commissioners to designate the shoreline of Lake Phelps as an AEC under Coastal Management regulations. This will place the county (counties of Tyrell and Washington), state (DNER & CD - state parks),and shoreline landowners in a three way contest for control and/or authority.

Recommendations and Conclusions :

1. The three way contest for authority over the Lake Phelps shoreline will probably have to be played out in court. I assume that the Sierra Club would support any shoreline strategy which protects the visual and ecological integrity of the state park lake. I recommend that we take no action on this aspect of the issue until such time as the contending parties clarify their positions and plans with respect to ensuring the protections cited above.

2. There is no direct relationship between water level control strategy for Lake Phelps and peat mining by First Colony Farms.

3. The Sierra Club commends Mr. Neil Griggs and his state parks staff for developing a water level management plan for Lake Phelps which recognizes the ecological importance of allowing seasonal variations in water level.

Sincerely,

Vince

Vince Bellis
Sierra Club/ Cypress Group

cc Dave Levy

12. ACKNOWLEDGEMENTS

Howard N. Lee	Secretary, N. C. Department of Natural Resources and Community Development
Dr. E. Walton Jones	Deputy Secretary, N. C. Department of Natural Resources and Community Development
Dr. Neil S. Grigg	Assistant Secretary, N. C. Department of Natural Resources and Community Development
William Raney	Attorney General's Office
James S. Stevens, Jr.	Director, Division of Parks and Recreation
Samuel J. Thomasson	Assistant Director, Division of Parks and Recreation
Thomas R. Wells	Resource Management Planner, Division of Parks and Recreation
Richard B. Hazard	Author of Lake Phelps Lake Level Environmental Impact Statement, Division of Parks and Recreation
Stanley N. Williams	Landscape Architect, Division of Parks and Recreation
John Taggart	Environmental Research Specialist, Division of Parks and Recreation
Hayward L. Dillard	Superintendent, Pettigrew State Park
Robert L. Spears	Park Ranger, Pettigrew State Park
Alan Klimek	Division of Environmental Management
Hai Tang	Division of Environmental Management
John Parker	Division of Marine Fisheries
T. Stuart Critcher	N. C. Wildlife Resources Commission
E. Sue McKenzie	Clerk Typist III
Carolyn O'Brien	Drafting Technician II
Staff	Natural Resources and Community Development Word Processing Center

This Task Force Report/Management Plan/Environmental Impact Statement would not have been possible without the invaluable aid of these people and many more not listed. Their aid and cooperation is greatly appreciated.

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